THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVI. No. 1425.] LONDON, SEPTEMBER 2, 1890. [42ND YEAR. Price 6d.

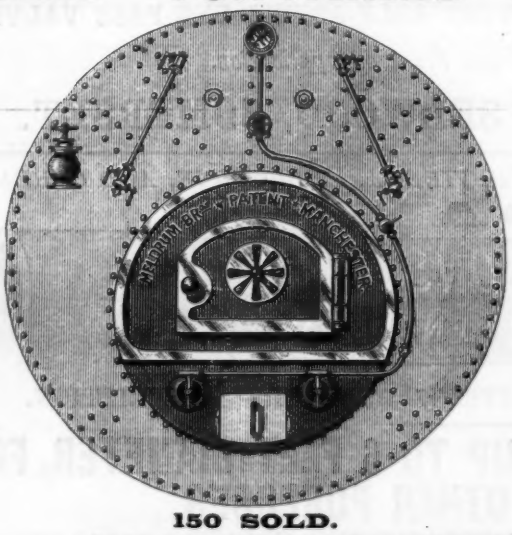
WOLSTON'S Paste and Ready Mixed for Use.
Guaranteed Free from Adulteration. **TORBAY PAINTS.**
FOR GASHOLDERS, &c., &c.
The Original "Torbay Paints"
As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.
Illustrated Price List Post Free.
TORBAY & DART PAINT Co., Ld.,
23, Gt. George St., Westminster, S.W.
DARTMOUTH, & BRIXHAM (TORBAY).

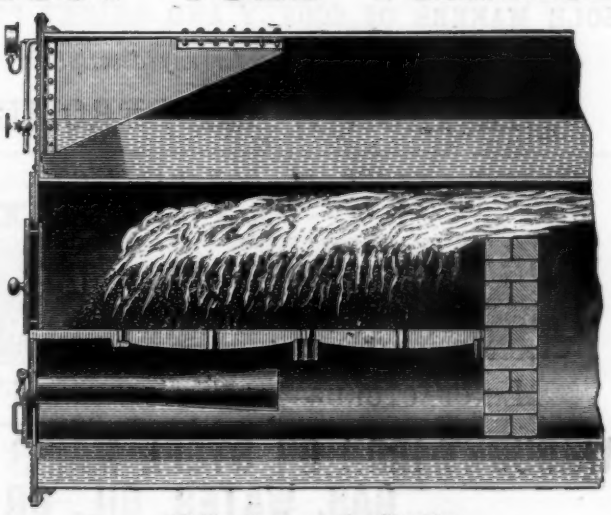
—ESTABLISHED 1830.—
PARKER & LESTER,
Manufacturers & Contractors.
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.
WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.
Ashmore, Benson, Pease, & Co., Ld.,
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
See Advertisement, p. 436.

CEMENT
EARLE'S
BEST
Portland Cement
MANUFACTURED BY
GEO. & THOS. EARLE,
HULL.
Office: 7, PIER STREET.
Works: WILMINGTON.
STOREAGE CAPACITY 10,000 Tons.
ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.
Telegraphic Address: "CEMENT HULL."

NORTON'S PATENT
"ABYSSINIAN" & ARTESIAN TUBE WELLS,
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
The following Town Water-Works Supplies have been obtained by this System, viz. :—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.
LE GRAND & SUTCLIFF,
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

SELF-CONTAINED DUST FUEL FURNACE.





150 SOLD.
Estimates on Application.
MELDRUM BROS.,
26, HALF STREET, CATHEDRAL YARD, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765),

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

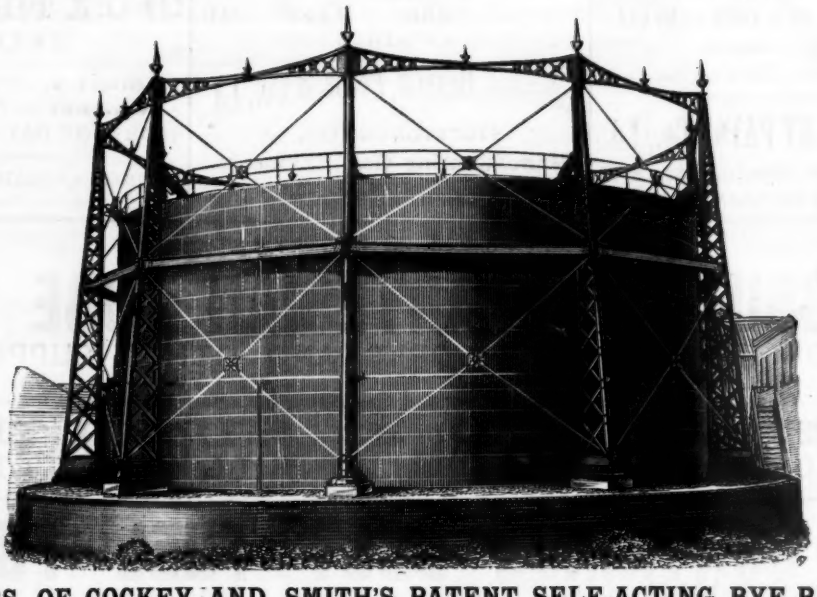
TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers, Ironfounders, & Contractors,

Manufacturers of *GASHOLDERS and TANKS, BOILERS and ENGINES, ROOFS, EXHAUSTERS, BREEZE SCREENS, CHARGING and COKE BARROWS.*



Manufacturers of *PATENT WASHERS, PATENT VALVES for PURIFIERS, &c., GOVERNORS, LAMP COLUMNS, Weighbridges, COKE BREAKERS.*

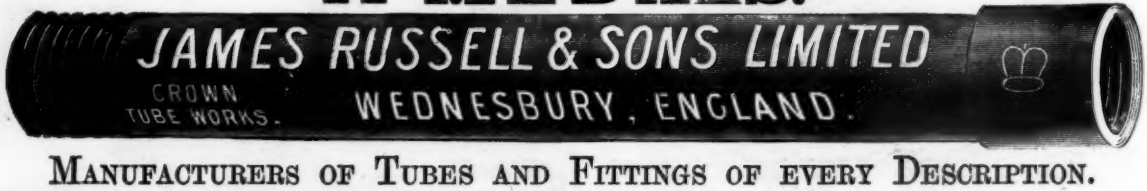
SOLE MAKERS OF COCKEY AND SMITH'S PATENT SELF-ACTING BYE-PASS VALVES.

Estimates for any description of Gas Plant on application.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

— 11 MEDALS. —



MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. BIRMINGHAM: 114, Colmore Row. LEEDS: 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO.,

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MANUFACTURERS OF

GAS APPARATUS

OF EVERY DESCRIPTION

INCLUDING

GASHOLDERS

and Tanks,

Retorts, Purifiers,

Valves, Scrubbers,

Condensers,

ETC., ETC.

All of the most approved Designs.

BOILERS, ENGINES, PUMPS,

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METERS, GAUGES, GOVERNORS, &c., &c.

FORD'S PATENT

"UNIVERSAL"

SCRUBBER-

WASHER.

Numbers at work, giving excellent results.

No Motive Power Required.

ALSO OF

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RETORT MOUTHPIECES

AND

SELF-SEALING LIDS.

NO LUTING REQUIRED.

Prices and Particulars on application.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES PREPARED FOR COMPLETE GAS PLANT.

London Offices: 14, GREAT ST. THOMAS APOSTLE, E.C.—J. E. & S. SPENCER, Agents.

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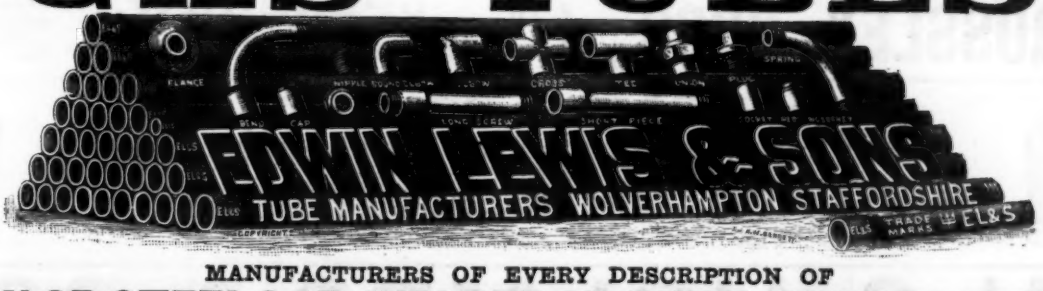
GAS TUBES



MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES,

WITH RACK & PINION,

OR

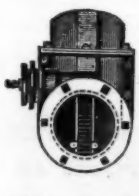
Internal or External

SCREWS, of all Sizes.

GASHOLDERS,

AND

Gasholder Tanks.



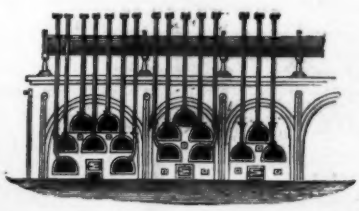
CAST-IRON RETORTS,

RETORT-BED FITTINGS,

And Retort-House Appliances

of every description.

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

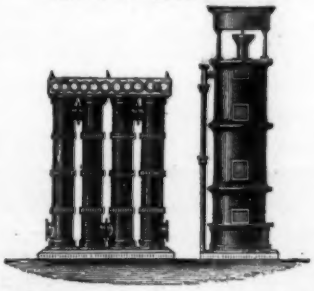


WROUGHT AND CAST IRON

CONDENSERS,

SCRUBBERS, & WASHERS,

TAR AND LIQUOR PUMPS, &c.



PATENT

CENTRE VALVES

for working Purifiers.

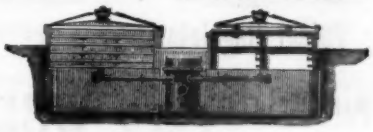
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS,

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

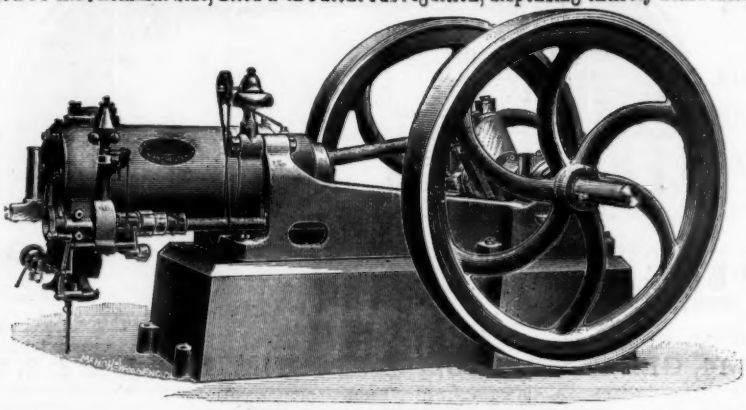
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

100 Prize Medals.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES
2-Man to 100-HP.

GAS-ENGINES
COMBINED
WITH
PUMPS
FOR
TOWNS SUPPLY
SEWAGE, &c., &c.

GAS-ENGINES
COMBINED
WITH
AIR COMPRESSORS
FOR THE
SHONE SEWAGE
SYSTEM, LUCIGEN
LIGHT, &c.

MADE in SIZES
2-Man to 100-HP.

VERTICAL
AND
HORIZONTAL
TYPES.

ENGINES
COMBINED
WITH
HOISTS, PUMPS,
DYNAMOS, &c., &c.

Largely used for
EXHAUSTING,
PUMPING,
COKE CRUSHING,
ELECTRIC LIGHTING,
&c., &c.

Over 31,000 "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

LONDON,
LIVERPOOL,
GLASGOW,
NEWCASTLE,
BIRMINGHAM,
HULL.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

W. C. HOLMES & CO.,

CONTRACTING GAS ENGINEERS.

SPECIALITIES.

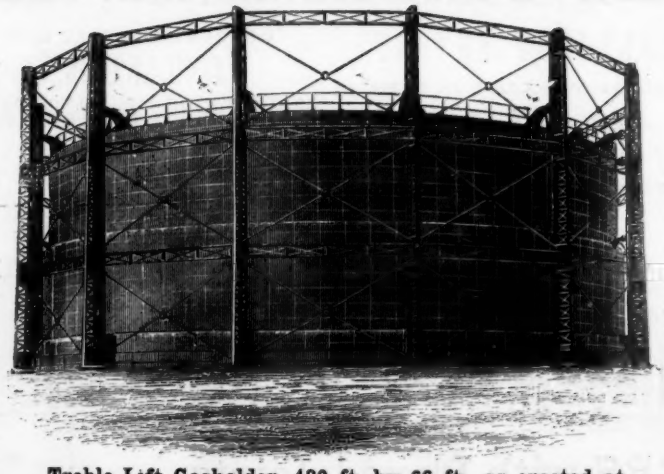
Patent Regenerative Retort-Settings.

Patent Rotary Scrubber-Washer.

Patent Reciprocating Exhauster.

Patent Regulator.

Patent Anti-Dip Pipes.



Treble-Lift Gasholder, 130 ft. by 66 ft., as erected at Burton-on-Trent, 1889.

SOLE MAKERS OF
DRAKE'S
PATENT
GAS PLANT
Specially adapted for Country Places, and for mixing with Coal Gas to increase Illuminating Power.

Condensers, Scrubbers, Purifiers, and all Fittings for Gas-Works.

IMPROVED
CHEMICAL PLANT.

WHITESTONE IRON-WORKS,
HUDDERSFIELD,
AND
80, CANNON STREET, LONDON, E.C.

Telegrams:
"Holmes Huddersfield."
"Ignitor London."

Illustrated Catalogues on application.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

A STOCK OF DIFFERENT SHAPES ON HAND.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
C X C	"JACKSON"	BECK & Co.
MARK.	CLAY CROSS.	130, GT. SUFFOLK ST., S.E.

SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES, APPLY TO THE

Sole Agents and Manufacturers,

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT, BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (4 Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

R. DEMPSTER & SONS, Ltd.,

ESTABLISHED 1855.

ROSE MOUNT GAS ENGINEERING WORKS,

ELLAND.

No. 1. Flange Valve.

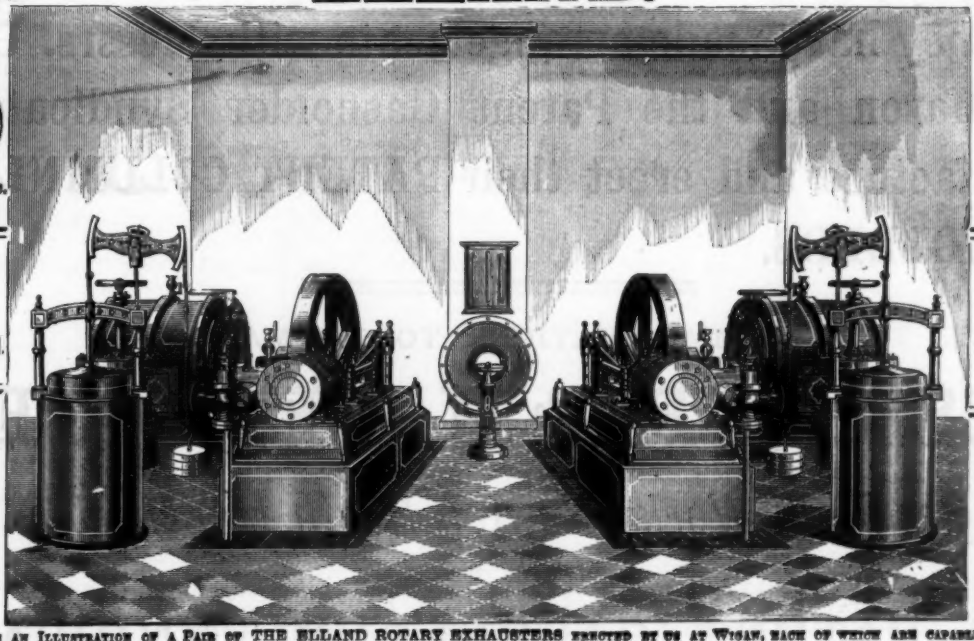
No. 5. Screw Valve.

NO SLIP.

NO OSCILLATION.

NO HIGH SPEED.

STEADY GAUGE.



No. 3. Screw Valve.

No. 6. Disc Valve.

The above is an Illustration of a Pair of THE ELLAND ROTARY EXHAUSTERS erected by us at Wigan, each of which are capable of passing 80,000 cubic feet of Gas per hour.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

Testimonials and References on Application to

DEMPSTERS', ELLAND.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

LIVERPOOL:
16, Lightbody Street.

LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS
HUNSLET,
LEEDS

LONDON OFFICE:
60, QUEEN VICTORIA STREET
E.C.

CLAYTON SON & CO. LTD.

MAKE A

SPECIALTY OF GASHOLDERS

AND MAKERS OF

REG^D TELEGRAPHIC ADDRESS: "GAS LEEDS"

GAS PLANT OF EVERY DESCRIPTION.

GAS COAL.

BEST
REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.

IMPORTANT ANNOUNCEMENT.

Messrs. Robert and John Dempster beg to announce that they have made arrangements with Messrs. Gadd and Mason and the Patent Gasholder Syndicate to manufacture and erect their PATENT COLUMNLESS GASHOLDERS.

ALL COMMUNICATIONS TO BE MADE TO

MESSRS. R. & J. DEMPSTER,

Gas Plant Works, Newton Heath, Manchester,

OR TO

THE PATENT GASHOLDER SYNDICATE,

504, STOCKPORT ROAD, MANCHESTER.

KIRKHAM, HULETT, & CHANDLERS' LTD.,

NEW PATENT

"STANDARD" WASHER.

EXTRACTS THE WHOLE of the AMMONIA

Also a Large Proportion of H_2S and CO_2 from Gas.

MINIMUM WEIGHT IN MOTION.
MINIMUM DRIVING POWER.
MINIMUM BACK PRESSURE.
MINIMUM WEAR AND TEAR.
WITH MAXIMUM RESULTS.

Testimonial from the Chief Engineer of The Gaslight & Coke Co.

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,

Messrs. KIRKHAM, HULETT, AND CHANDLER, LIMITED, *Nov.* 25, 1889.

GENTLEMEN,—In reply to your enquiry respecting the result of putting "Wooden Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. TREWBY.

NOTE.—The first Washer referred to in the above was fitted with improved "Bundles" in May, 1888; and these have proved so satisfactory that The Gaslight and Coke Company have had several other "Standard" Washers fitted in the same manner, and have recently given an order for machines for 6,000,000 cubic feet per day.

396 **"Standard" Washer-Scrubbers supplied (and in course of construction), equal to a daily capacity of 359,560,000 cubic feet of Gas.**

FOR LIST OF ORDERS, SEE PREVIOUS ADVERTISEMENTS.

PALACE CHAMBERS, BRIDGE STREET,

WESTMINSTER, S.W.

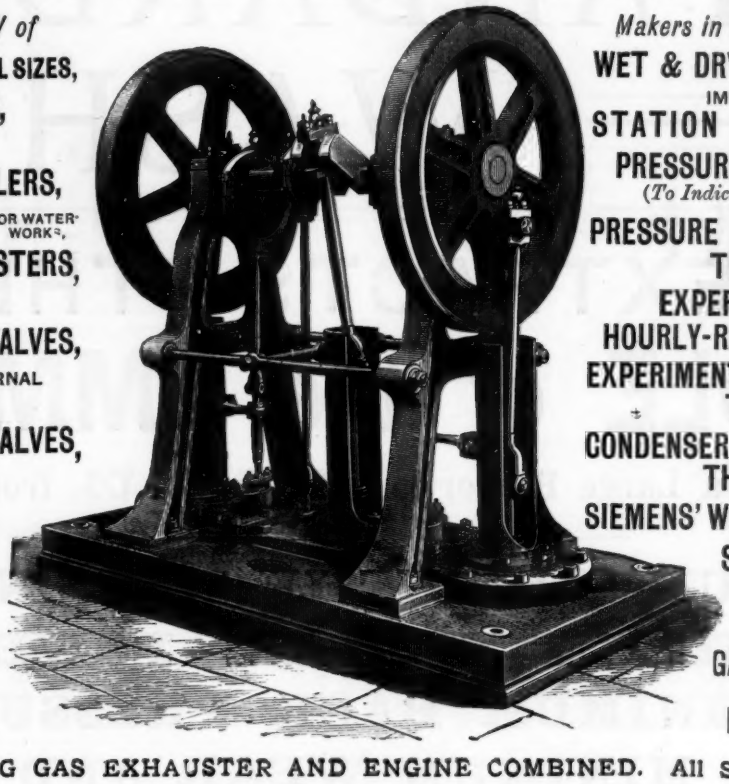
R. LAIDLAW & SON,

GAS AND WATER ENGINEERS.

Manufacturers of **GAS APPARATUS** of every Description.

Makers in GLASGOW of

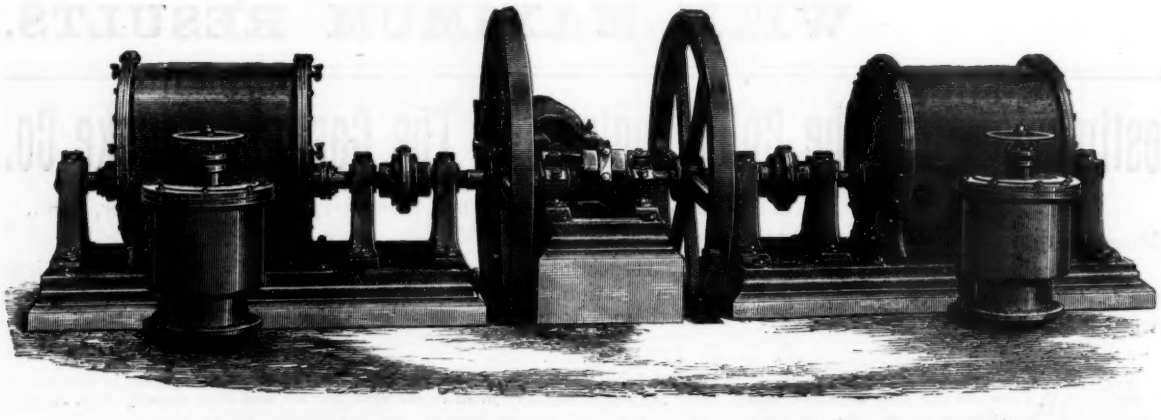
CAST-IRON PIPES, ALL SIZES,
LAMP PILLARS,
STEAM-ENGINES AND BOILERS,
PUMPING ENGINES FOR WATER-WORKS,
BEALE'S GAS EXHAUSTERS,
DOUBLE-FACED SLUICE VALVES,
INTERNAL AND EXTERNAL RACK OR SCREW SLIDE VALVES,
CAST-IRON COLUMNS,
BEAMS, GIRDERS, AND WATER-TANKS,
WROUGHT-IRON TUBES, FITTINGS, &c.



Makers in EDINBURGH of

WET & DRY GAS-METERS,
IMPROVED STATION GOVERNORS,
PRESSURE REGISTERS (*To Indicate New Time*),
PRESSURE GAUGES,
TEST HOLDERS,
EXPERIMENTAL HOURLY-RATE METERS,
EXPERIMENTAL TEST METERS,
CONDENSER THERMOMETERS,
SIEMENS' WATER-METERS,
STREET LANTERNS,
And all Kinds of GAS APPARATUS AND FITTINGS, &c.

PUMPING GAS EXHAUSTER AND ENGINE COMBINED. All Sizes.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED. All Sizes.

Prices, with full Particulars, will be given on application.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,
INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

TANGYES LIMITED,

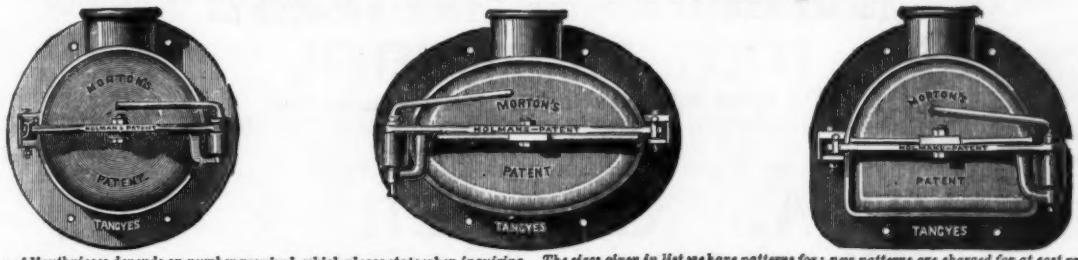
CORNWALL WORKS, BIRMINGHAM.

DEPÔTS AT

LONDON . . . . 35, QUEEN VICTORIA ST., E.C. | MANCHESTER . . . . . DEANSGATE
NEWCASTLE-ON-TYNE ST. NICHOLAS BUILDINGS | GLASGOW . . . . . ARGYLE STREET

Sole Makers of **MORTON'S** Patent Self-Sealing **RETORT-LIDS,**

With Anti-Friction CATCHES, and Self-Sustaining CROSS-BARS.



Price of Mouthpieces depends on number required, which please state when inquiring. The sizes given in list we have patterns for; new patterns are charged for at cost price.

These Patent Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, D, oval, and round (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

Mouthpieces with Circular Lids for Oval Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
13658	14 ins.	14 × 12 ins.	15 ins.	£0 19 0
4356	14 ,,	18½ ,, 12 ,,	12½ ,,	0 19 0
6851	15 ,,	16 ,, 14 ,,	13 ,,	1 0 0
3629	15 ,,	18½ ,, 13½ ,,	14 ,,	1 0 0
3580	15 ,,	21 ,, 15 ,,	15 ,,	1 0 0
6264	16 ,,	18½ ,, 15½ ,,	15½ ,,	1 1 0
5210	16 ,,	20 ,, 14 ,,	15 ,,	1 1 0
6263	16 ,,	24 ,, 16 ,,	13½ ,,	1 1 0
5370	17 ,,	20 ,, 14 ,,	14 ,,	1 3 0
6832	17 ,,	20 ,, 14 ,,	17 ,,	1 3 0
6183	17 ,,	20 ,, 15 ,,	15 ,,	1 3 0
4289	17 ,,	21 ,, 15 ,,	14 ,,	1 3 0
5270	17 ,,	22 ,, 14 ,,	14 ,,	1 3 0
3631	18 ,,	18 ,, 14 ,,	20 ,,	1 5 0
3681	18 ,,	21 ,, 14 ,,	13½ or 15 ,,	1 5 0
3554	18 ,,	21 ,, 15 ,,	14½ ,,	1 5 0
7957	18 ,,	22 ,, 16 ,,	14 ,,	1 5 0
8048*	19 ,,	25½ ,, 15 ,,	18 ,,	1 8 6

Mouthpieces with Oval Lids for Oval Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
9800	18 × 14½ ins.	18 × 14½ ins.	15 ins.	£1 5 0
9205	20 ,, 13 ,,	24 ,, 14 ,,	10½ ,,	1 10 0
10000	20½ ,, 14½ ,,	23½ ,, 14½ ,,	15 ,,	1 10 0
9680	21 ,, 15 ,,	21 ,, 15 ,,	15 ,,	1 12 0
10056	21 ,, 14½ ,,	21 ,, 14½ ,,	15½ ,,	1 12 0
13218	21 ,, 15 ,,	21 ,, 15 ,,	17 ,,	1 12 0
10514	22½ ,, 13½ ,,	22½ ,, 13½ ,,	13½ ,,	1 13 0
13766	20 ,, 17 ,,	20 ,, 17 ,,	15½ ,,	1 15 0
13269	24 ,, 15 ,,	24 ,, 15 ,,	16 ,,	1 18 0

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Mouthpieces for Round Retorts.

Diam. .. .. ins.	14	15	16	17	18
Price, Lid and Fittings without Mouthpiece £	0 19 0	1 0 0	1 1 0	1 3 0	1 5 0

Mouthpieces with Circular Lids for D Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpieces.	PRICE, Lid and Fittings without Mouthpiece.
5348	14 ins.	14 × 13 ins.	7 ins.	£0 19 0
3463	15 ,,	15 ,, 13 ,,	14 ,,	1 0 0
6678	15 ,,	15 ,, 14 ,,	12 ,,	1 0 0
3661	15½ ,,	15½ ,, 13 ,,	12 ,,	1 1 0
13062	16 ,,	16 ,, 13 ,,	18 ,,	1 1 0
5601	16 ,,	16 ,, 14 ,,	15 ,,	1 1 0
6827	16 ,,	16 ,, 14 ,,	17 ,,	1 1 0
4494	16 ,,	16 ,, 14 ,,	14 ,,	1 1 0
3548	16 ,,	16 ,, 15 ,,	12½ ,,	1 1 0
6677	16 ,,	16½ ,, 13½ ,,	12½ ,,	1 1 0
9645	16 ,,	16½ ,, 13½ ,,	12½ ,,	1 1 0
4434	16 ,,	17½ ,, 14 ,,	14 ,,	1 1 0
6469	16 ,,	18 ,, 14 ,,	15 ,,	1 1 0
9015	16 ,,	18 ,, 14 ,,	18½ ,,	1 1 0
4327	16 ,,	18 ,, 15 ,,	15½ ,,	1 1 0
8049*	16 ,,	18 ,, 15 ,,	17½ ,,	1 1 0
6137	16 ,,	20½ ,, 13½ ,,	13½ ,,	1 1 0
5918	17 ,,	18 ,, 14 ,,	14 or 17 ,,	1 3 0
5053	17 ,,	19⅜ ,, 12 ,,	14½ ,,	1 3 0
7548	17 ,,	20 ,, 13 ,,	15 ,,	1 3 0
6468	17 ,,	20 ,, 16 ,,	15½ ,,	1 3 0
4316B	17 ,,	21 ,, 14 ,,	14 ,,	1 3 0
7975	17 ,,	21 ,, 15 ,,	14½ ,,	1 3 0
13459	17 ,,	21½ ,, 13½ ,,	15 ,,	1 3 0
12990	18 ,,	18 ,, 15 ,,	15 or 19 ,,	1 5 0
7135	18 ,,	18⅜ ,, 15 ,,	13 ,,	1 5 0
10221	18 ,,	18 ,, 16 ,,	12½ ,,	1 5 0
4506	18 ,,	20 ,, 13 ,,	19½ ,,	1 5 0
6470	18 ,,	20 ,, 13 ,,	15 ,,	1 5 0
6818	18 ,,	20 ,, 13½ ,,	17½ ,,	1 5 0
4083	18 ,,	20 ,, 15 ,,	16 ,,	1 5 0
5306	18 ,,	20½ ,, 14 ,,	13½ ,,	1 5 0
13295	18 ,,	20½ ,, 14 ,,	19½ ,,	1 5 0
7356	18 ,,	20½ ,, 13½ ,,	18 ,,	1 5 0
4569	18 ,,	21 ,, 14 ,,	18 ,,	1 5 0
3628	18 ,,	21 ,, 15 ,,	16 ,,	1 5 0
7640	18 ,,	22 ,, 12½ ,,	15½ ,,	1 5 0
7971*	20 ,,	20 ,, 15 ,,	18 ,,	1 11 0

*Patterns marked * have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked* B *have curved bottoms.* 191

Mouthpieces with D Lids for D Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimension of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
12292	15½ × 13 ins.	15½ × 13 ins.	12 ins.	£1 2 0
9967	16 ,, 14 ,,	16 ,, 14 ,,	12½ ,,	1 3 0
13574	16⅝ ,, 13⅝ ,,	16⅝ ,, 13⅝ ,,	12½ ,,	1 4 0
9899	18 ,, 12 ,,	18 ,, 12 ,,	14 ,,	1 4 0
12980	16 ,, 16 ,,	16 ,, 16 ,,	18 ,,	1 6 0
13900	18 ,, 13½ ,,	18 ,, 13 ,,	15 ,,	1 6 0
9912	18 ,, 13½ ,,	18 ,, 13½ ,,	17 ,,	1 6 0
9962	18 ,, 13½ ,,	18 ,, 13½ ,,	16 ,,	1 6 0
10982	18 ,, 13½ ,,	18 ,, 14 ,,	15 ,,	1 6 0
11098	18 ,, 14 ,,	18 ,, 14 ,,	12 ,,	1 6 0
9492	20 ,, 13 ,,	20 ,, 13 ,,	15 ,,	1 10 0
9208	20 ,, 13 ,,	20 ,, 13 ,,	19½ ,,	1 10 0
10251	20 ,, 13 ,,	20 ,, 13 ,,	15½ ,,	1 10 0
12964	20 ,, 13 ,,	20 ,, 13 ,,	13½ ,,	1 10 0
9909	20 ,, 13½ ,,	20 ,, 13½ ,,	17 ,,	1 10 0
12969	19½ ,, 15½ ,,	19½ ,, 15½ ,,	14 ,,	1 11 0
13781	20 ,, 15 ,, Front. / 21 ,, 15 ,, Back.	21 ,, 15 ,,	15 ,,	1 11 0
7692	21 ,, 15½ ,,	21 ,, 15½ ,,	16 ,,	1 11 0
12978	20 ,, 16 ,,	20 ,, 16 ,,	17 ,,	1 11 0
13252	20 ,, 16 ,,	20 ,, 16 ,,	18 ,,	1 11 0
13220	21 ,, 15 ,,	21 ,, 15 ,,	17 ,,	1 11 0
8977	21½ ,, 13½ ,,	21½ ,, 13½ ,,	18½ ,,	1 11 0
8976	21½ ,, 13½ ,,	21½ ,, 13½ ,,	18½ ,,	1 12 0
10497	21½ ,, 13½ ,,	21 ,, 13½ ,,	18½ ,,	1 12 0
8037	21½ ,, 13½ ,,	21½ ,, 13½ ,,	18½ ,,	1 12 0
9908	21½ ,, 13½ ,,	21½ ,, 13½ ,,	15 ,,	1 12 0
10404	21½ ,, 13½ ,,	22 ,, 14 ,,	18½ ,,	1 12 0
12410	21½ ,, 13½ ,,	22 ,, 14 ,,	12 ,,	1 12 0
13822	21½ ,, 13½ ,,	22 ,, 14 ,,	15 ,,	1 12 0
10515	22½ ,, 12½ ,,	22½ ,, 12½ ,,	13½ ,,	1 12 0
7924	24 ,, 14 ,,	24 ,, 14 ,,	15½ ,,	1 13 0
13807	24 ,, 15½ ,,	24 ,, 15½ ,,	16 ,,	1 14 0
9015B	25 ,, 14 ,,	25 ,, 14 ,,	12½ ,,	1 14 0
10932	25 ,, 14 ,,	24 ,, 14 ,,	13½ ,,	1 15 0
12944B	22 ,, 16 ,,	22 ,, 16 ,,	16 ,,	1 15 0

Patterns marked B *have curved bottoms.* 192

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6 ,, .. 22 10	12 ,, .. 38 0	18 .. 50 0	36 ,, .. 130 0

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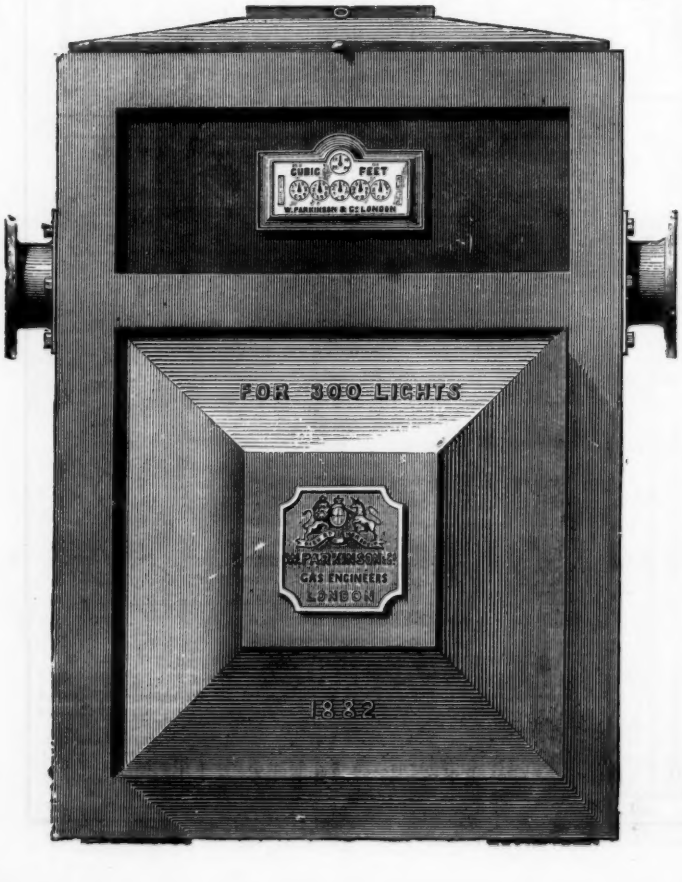

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TO CORRESPONDENTS.

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 2, 1890.

Labour Questions.

IT appears to be a settled thing that if information about labour questions is needed, the very last place in which to seek it is the pages of a professed labourers' newspaper. This was a complaint we had occasion to make of the defunct *Labour Elector;* and the successors, both Metropolitan and provincial, of that mysteriously managed publication copy its weakness in this respect to a perfectly irritating extent. The truth seems to be that everyone of these "organs" is identified with the interest of a particular agitator, or group of agitators, who are divided into many opposing camps; and none will help the others if it can be avoided. All the so-called labour press was suspiciously silent on the subject of the South Wales railway men's strike, recently ended probably because the cry so dear at present to the Opportunist Socialist—the legislative Eight-Hour Day—was not raised in connection with this movement. In the settlement of the strike, moreover, while the men gained the ten-hour day for which they were contending, the question of freedom of labour remained precisely where it was at the beginning; and the employers succeeded in keeping clear of the position which the men sought to force upon them—of acting as agents for the Union. At Norwich there has been a "storm in a tea-"cup" over the vexed question of the strength, numerical and financial, of the Gas Workers' Union. A local Socialist orator challenged the assertion of the President of the Union that its membership numbered 120,000, and demonstrated, from the only available accounts, that the total number of subscribing members could not possibly exceed one-fourth of the stated figure. He further scandalized the Unionists by declaring that their accounts were confused, and that there was somewhere an unexplained deficiency of about £2000 in the funds. The matter was considered by the Union Executive of sufficient gravity to require the personal explanation of the Secretary (Mr. W. Thorne), who accordingly went to Norwich to meet the local critic, and, if possible, confute him. A public debate took place between the two opposing champions of the labour interest; and although it ended in their ostentatiously shaking hands, it cannot be said that the points in dispute were satisfactorily cleared up. The fact appears to be that these Unions of unskilled labourers, which, as we have already pointed out, can only be called "Trades" Unions by courtesy, have not yet learnt how to manage their statistics and accounts. They have been so afraid of allowing the supreme power of the purse to pass out of the hands of men of their own class, that they have not recognized that the management of accounts, whether relating to a number of voluntary subscriptions and payments or to the business of a brewery, is a special undertaking for which proper training and experience are necessary. Hence it may be confidently predicted that when matters of this kind are left to workmen who know nothing about them, confusion is certain to arise sooner or later; and, with confusion, misunderstandings and recriminations, if not actual disaster. So long as strikes are on hand, and general enthusiasm prevails, these routine matters are lost sight of; but when the day of reckoning comes, as it inevitably does, awkward questions can no longer be put aside. Probably nothing has done the redoubtable John Burns more damage in the eyes of many of his whilom admirers than that remarkable expenditure of £65 in cab-hire during one quarter, which another agitator, William Thorne, never permits to be forgotten by those who remind him of his own drafts upon the funds of his Union. All these matters are, of course, small in themselves; and we do not allude to them by way of reproach to those men who, having given up their own means of livelihood in order to serve the Unions with which they are identified, must live by, as well as for, the latter. The labourer is worthy of his hire, even if he cannot keep accounts and explain every item of his personal and official expenditure. All the same, these questions show that the lot of the agitator, when he takes in hand matters which he does not understand, is not a happy one. The Labour Unions are on their trial now, and will be in the same case for years to come. Meanwhile, it will be necessary to regard with the most extreme reserve optimistic statements respecting their standing and prospects. Their leaders are prone to make magnificent assertions as to their wealth and power, in order to impress the popular imagination; but they owe it to their own characters that in such a delicate matter as their dealings with the money of others, they should have neither secresy nor misrepresentation; and they will therefore find it economical in the end to employ professional men in the management of their books.

The Anarchist section of the London Press has fastened tooth and nail upon the case of the Enfield lock-out, and the assistance afforded to the Gas Company by Mr. Frank Livesey, of the South Metropolitan Gas Company. It is not for us to enter into a discussion of the rights of this particular case, which is that of several other gas undertakings where last winter concessions were made to the Union that are now being recalled. It is easy to understand how these cases of small strikes and locks-out are of supreme importance to the Union leaders; for they must see that unless the supremacy of their organization can be maintained under such minor trials as those which have arisen at Enfield, Barnsley, Bromley, and elsewhere, it will speedily be abandoned by the men who now support it. The peculiarity of these local skirmishes between Gas Managers and the Unionists is that, whenever they arise, the name of Livesey is mixed up with them, even to the eclipsing of those of the local combatants. It is always

"Mr. Livesey"—the Christian name frequently indeterminate—who is once more engaged in "smashing the "Union;" and accordingly the "Labour" press howls at the word, as though it filled the agitators who inspire these organs of opinion with rage and fear too deep and great for intelligible expression. It is not the fault either of Mr. George or Mr. Frank Livesey that their name is commonly cited in connection with these disputes. The fact is that the Gas Workers' Union deprived the South Metropolitan Gas Company in December last of about 2000 men, mostly trained and reliable stokers. It has been impossible for the Company's Engineers to reinstate these men when they returned, as most of them did, to beg for work after having discovered the hollowness of the Union promises, because their places had been filled; but as the poor fellows, whose credulity has been their ruin, were in general starving, the officials have done their best for them in a variety of ways. The first thing to do in such cases, of course, is to register the applicant's name and address as a candidate for any vacancy that may offer. Therefore the South Metropolitan Company's engineering staff have for months had upon their lists the names of scores and even hundreds of good stokers ready to jump at any opening for employment. Other gas managers throughout the country have been fully aware of this fact, and have applied to Mr. Frank Livesey, as Chief Engineer, or to one of his assistants, when they have needed fresh hands. These appeals have never been in vain, for the reasons given above; and therefore the name of Livesey has been synonymous, in times of locking-out, with success for the employers and defeat for the Union, except in an exceptional instance, where local incapacity defied outside help. In assisting a fellow gas manager out of a difficulty, and in finding employment for men who needed it, Mr. Livesey does what would be deemed a good action in ordinary circumstances; but since it is the Gas Workers' Union that suffers from these appeals to him nothing bad enough can be said of him in some quarters.

Mr. Frank Livesey's statement in the newspapers, that the men he recommended to the Enfield Gas Company were ex-Unionists, who, having been ordered out on an unsuccessful strike, had been deserted by their Union, and were consequently in almost a starving condition, has made a considerable sensation throughout the country. It was replied to in a fashion by Mr. W. H. Ward, signing himself Assistant General Secretary of the National Union of Gas Workers and General Labourers, who, of course, called it a "very erroneous and misleading statement." He "denied altogether" that the men in question had been deserted by the Union, and declared that "there is not a "Union in England which has stood by the men more "loyally than this, inasmuch as, though the strike only "lasted eight weeks, we paid strike pay to those victims "of 'Bro. George's' bonus scheme for 17 weeks." It would be absurd to expect Mr. Livesey to bandy words with this writer, whose slipperiness in debate was recently tested by Mr. John West; but as Mr. Ward is an assiduous reader of the JOURNAL, we take this opportunity of essaying the clearing up of a mysterious matter, and invite him to inform our readers: (1) Who were the men that received what he so magniloquently describes as "strike pay" for 17 weeks? (2) What was the net amount received weekly per head, after the levy had been deducted, down to the last? (3) Did the recipients voluntarily relieve the Union of the duty of further assisting them, or were they told that there was no more money for them? Categorical answers to these questions would be valuable in the interest of the men who still subscribe to the Union, as well as to the general public. We have heard reports to the effect that the farcical compromise concluded by the Union Executive with Mr. George Livesey (which compromised nothing, but merely gave the Unionists an excuse for declaring the strike to be over) was wanted by the Union Executive as a reason for stopping strike pay—10s. per week, less from 2s. 6d. to 3s. 6d. levy—to the majority of the poor wretches who had been deluded into the hope of being taken back into the Company's employ with increased wages. Further, that such strike pay as continued to be given was voted to themselves by the local Branch Committee as long as it lasted; and that at the end of the 17 weeks named by Mr. Ward, the Secretary, or Paymaster, or some other "last man" on the job, voted himself the last eighteenpence left in the box, and then, declaring the strike terminated, went off to throw himself on the mercy of his old employers, well knowing that he had nothing to look for from Messrs. Thorne, Ward, and Co. If Mr. Ward can give us the rights of this matter, he shall have the opening for it; but it may be as well to remark that any statement of the kind will be narrowly scrutinized by those who know the truth, and have no longer any interest in concealing it.

We see that Mr. John Burns notifies his intention of calling "public attention" to Mr. Livesey's "bribe to the "police," as he quaintly calls the contribution of the South Metropolitan Gas Company to the various funds of the Force. Having already published his desire, it is difficult to understand in what other shape Mr. Burns can take action. Perhaps he means to call a mass meeting to protest against the receipt of the money by the police authorities. Doubtless he could do this, and get his thousands together with bands and banners to listen once more to the London stock company of open-air spouters, just as he could easily employ the same machinery to denounce the administration of the weather, if anything could be made out of it. The Anarchist press of course applauds Mr. Burns's intention, and declares that Mr. Livesey gave the police £600 "because they protected his "blacklegs." Until somebody is made to smart for applying this term to the men who are willing to take up work that others throw away, it will continue to be used by writers who have no other arguments. It is high time, however, that Trades Unionists learnt that if "soft "words butter no parsnips," so hard terms frighten nobody out of working, unless accompanied by brickbats, which are arguments that take any side. As for Mr. Burns's idle threat, it may be left to spend itself upon the air; for nobody will probably take any more notice of it than we have done. If the South Metropolitan Company had done nothing of the kind, Mr. Burns would likely enough have been the man to pose as the friend of the police, and abuse the meanness of the wealthy capitalists who were unwilling to make the slightest acknowledgment of their indebtedness to the Force. As "the cat jumps," so these demagogues talk, and twist their immortal principles to the exigencies of the hour.

The Gas Industry in the Country.

IT will be gathered, from the accounts of the yearly and half-yearly meetings of large and small Gas Companies throughout the United Kingdom, of which we are now giving brief reports in the JOURNAL, that very much the same influences have been at work upon the industry everywhere. This was to have been expected; and the individual cases in point have shown so little divergence from the average record, that none of them calls for special remark. Liverpool, for example, shows a typical record; and if this is taken as the guide, all the rest may be understood. The demand for gas has shown a fair, if not a large increase; and this has helped to balance the additional cost of coals, materials, and labour which all manufacturing concerns have had to pay during the past year. Liverpool does not mean to raise the price of gas just yet, although such a possibility is not to be excluded from considerations of the future. The great fact remains, however, as we stated it last week when referring to the onslaught that certain speculators have made of late upon gas property in general, and The Gaslight and Coke Company in particular, and it was well expressed by Mr. Edward Lawrence, the Chairman of the Liverpool United Gaslight Company, who remarked at the recent general meeting of the Company that "the steady consumption of "gas would go on, and that their property would be just "as safe in the future as it had been in the past." There is no questioning the truth of these remarks; but it is necessary that the truth should be spoken, or else it will incur danger of being obscured or perverted by those whose interest lies in damaging the Gas Companies. Beyond the proof of this central fact which they supply, the accounts of the bulk of the Provincial Gas Companies call for little comment at this time. In most cases there are accumulated funds which will, it is hoped, help to tide over the pinch of the little coal famine that has been created by the action and reaction of coal owners and workers. If not, and wherever an increase in the price of gas is rendered necessary by the fact of a company having sailed rather close to the wind in the past, it is well understood that the rise has been made as slight as is at all consistent with the conduct of

the undertaking; and that when the temporary pressure is removed, reductions will follow at the earliest possible moment, in order that the bond of interest which unites gas producers and gas consumers may not be ruptured. Indeed, we are not sure that where increases in price have taken place under the sliding scale, resulting in diminished dividends, the fact of the essential union of the two interests has not been driven home to the public mind more pointedly even than by additional dividends following upon reductions. A few of these lessons, however, go a long way.

The Manchester District Institution at Lancaster.

FINE weather and an excellent programme, which was carried out without the slightest hitch, were the distinguishing features of the summer meeting of this Institution. The gathering took place at the historic borough of Lancaster; and the proceedings included a visit to the ancient Castle, which crowns the hill overlooking the town, and a drive to Morecambe—a thriving watering-place some half-dozen miles away. There was also the attraction of a visit to the Lancaster Corporation Gas-Works, where Mr. Charles Armitage, the Engineer and Manager, is carrying out with much success the process of tar distillation. Time was also found for a brief meeting, at which one paper was read and another discussed. Altogether, it was a day to be remembered. Its chief value, from a business point of view, is probably to be found in the extra attention which is not unlikely to be paid to the subject of tar distilling. Mr. Armitage's apparatus is simple, and occupies only a moderate space; while the results are of a remarkable character. When it is stated that from every ton of tar he obtains distillates of the actual selling value of £2 9s., less a small expenditure on wages and the necessary allowance for wear and tear of plant, we have a fact of more than passing interest. Many gas engineers have hesitated to adopt, or even seriously consider, the question of tar distilling, because of the nuisance likely to result from it, and the consequent difficulties with people living near the works. Upon this point Mr. Armitage's testimony is also of value. It is not denied that some effluvia are given off at certain stages of the process; but it has not been sufficiently marked or objectionable to provoke remonstrance from those dwelling or carrying on other manufactures near the works. Two important points are thus decided by Mr. Armitage's experience: First, tar distilling pays, and pays well; secondly, it can be carried on upon a moderate scale without causing any very great nuisance.

A Theorist on the Sanitary Aspects of the Gas Industry.

A PAPER on the effluvia from gas-works was contributed to the Congress of the Sanitary Institute last week by Mr. W. H. Collins, Consulting Chemist and Gas Examiner for several Lancashire Corporations and Gas Companies; and an abstract will be found in our report of the proceedings. It began by stating that many eminent sanitarians have given it as their opinion that the public health in the neighbourhood of gas-works is seriously prejudiced by the effluvia arising from the various processes of gas manufacture. It also quoted half-a-dozen foreign authorities to prove that chronic poisoning is perceptible in people employed in gas-works; exhibiting itself in a slow pulse, weakness and depression, furred tongue, pale face, and emaciation. It further recounted the interesting facts that carburetted hydrogen can be breathed for a short time, but eventually produces convulsions and vomiting; that ammoniacal vapour has a marked and irritating effect on the conjunctiva; that sulphur dioxide causes bronchitis; and that carbon disulphide acts upon the nervous tissue with an anæsthetic effect, culminating in deafness, and even amaurosis. "For these effluvia and emanations the "gas-works are responsible, though if proper precautions "be taken the harm can be palliated, or at least lessened." Mr. Collins then went on to describe the processes of gas making, in order to be able to trace the origins of the deadly emanations which he had to deal with; declaring that all these operations, "when indifferently carried on, are pro- "ductive of dangerous nuisances." The main purpose of the paper seems to have been to recommend lime purification for carbonic acid alone, with oxide for sulphuretted hydrogen; leaving out of the question what is known as sulphur purification by lime, because this operation creates a "disgusting and poisonous nuisance." We have no doubt that Mr. Collins meant well in preparing his contribution to the proceedings of the Congress; but it is always regrettable when papers dealing with the technicalities of gas manufacture, or of any other industry, are sent to Societies incompetent to deal with their subject. The Sanitary Institute may be a useful organization in its own way; although this would be a somewhat bold assumption to make. Its managers do not improve its position, however, by receiving papers in the free-and-easy style which they habitually practise. They will take papers from anybody on any subject, provided only that the word "sanitary," or some equivalent thereto, can be wedged into the titles. Mr. Collins's paper was, in the author's absence, taken as read; but if it had been brought before an assembly competent to criticize it, it might have been dressed into acceptable shape as a contribution to the literature of gas manufacture. As it stands, however, it is merely a crude piece of theorizing.

We all know by this time how much value to attach to the dreams of Continental specialists about the pecular diseases incidental to various industries. These are sanitarians of an odd type. They profess to be able to identify an infinite number of poisons to be found in air, water, earth, food, and raiment. They are fearfully learned in bacilli, germs, and ferments; and yet the probability is that an adventurous English visitor who should dare to hunt them up in their own dingy lairs would have to step across open drains in the streets, and pass through chambers in comparison with which the most evil-scented gas-works in these islands would smell sweet and refreshing. Mr. Collins is careful not to bring any personal testimony in support of the general drift of his paper, which is that gas making is, on the whole, an unhealthy and dangerous industry; yet one new and well-authenticated fact would be worth all his musty foreign theory. It is well known, for all Mr. Collins has read to the contrary, that gas workmen are an exceptionally healthy class, as the statistics of their sick and provident societies testify; and it is idle to assert that they show any particular kind of slow poisoning due to their occupation. Stokers and firemen are of course liable to chills, if careless; and they are not, as a class, overburdened with fat. Gas-works yard-hands and mechanics are like most other town workers in being paler than sailors or farm hands; but to say they are less strong on that account would be absurd. With regard to the position taken up by Mr. Collins on the subject of sulphur purification, it is only necessary to say that if he knew more about the way in which this is carried out in London and other places where the sulphur in gas is kept down according to law, he would not talk so glibly about the essential nuisance of the process. If the paper had been read before a competent auditory, this as well as the other points in which the author's theory runs counter to practice would have been easily corrected.

The London Gas Supply.—At the meeting of the Balloon Society of Great Britain last Friday evening, a paper was read by Mr. Edmund Kimber entitled "The London Gas Supply;" and a resolution was afterwards passed, declaring that "the time had arrived when it becomes imperative for the ratepayers to take the control of the Gas Companies into their own hands, and that the same be entrusted to the London County Council as representative of the Metropolis." An abstract of the paper and a report of the discussion which followed will be given next week.

Visit of Manchester Gas Officials to the Beckton and Southall Gas-Works.—A deputation of the Gas Committee of the Manchester Corporation, consisting of Mr. Alderman King, Chairman of the Rochdale Road station, and Mr. Hinchliffe, Chairman of the Bradford Road works, with several other members of the Committee, Mr. Charles Nickson, the Superintendent, and Mr. S. Barratt, one of the station Managers, have recently been visiting the Beckton and other gas-works in London, with the view of inspecting the most recent development of West's drawing and charging machinery driven by ropes and the inclined retorts now in operation in London. They were met at Beckton by Mr. F. Beale, the Resident Engineer, and proceeded to inspect the experimental inclined retort machinery for charging which has been patented by Mr. G. C. Trewby, the Company's Engineer-in-Chief. They afterwards went through a retort-house where some inclined retorts were being erected upon a practical scale; and then passed on to No. 12 retort-house, the whole of which, as our readers will remember, has been fitted up with Mr. West's most recent improvements in machinery driven by ropes for drawing and charging retorts, for working 810 retorts. Last Saturday the party visited the Southall Gas-Works, to inspect the Coze and Morris system of inclined retort-settings.

WATER AND SANITARY AFFAIRS.

We have received a letter, somewhat long, and in a printed form, signed "Archibald E. Dobbs," setting forth sundry details connected with a dispute between the Southwark and Vauxhall Water Company and "a certain "schoolmaster." It is admitted that the latter was in arrear—"very much so"—with his water-rates, and it came to pass that the Company cut off the supply. But our correspondent wishes to know why, "if the Company "wanted their money"—which of course they did—they adopted the plan of cutting off, instead of taking out a County Court summons, so as to make the defaulter pay, with costs. We need hardly say there are very weighty reasons in such cases for a more immediate and direct remedy than that which is offered by the County Court. So far as leniency is concerned, the Water Company in this case seem to have allowed the consumer a tremendous amount of credit. "Short reckonings make long "friends;" and the protracted credit granted to the schoolmaster led to a complication which was rather intensified than otherwise by the intervention of Mr. Dobbs, who was only too happy to enter into the fray. Among other incidents, a correspondence took place between the Company and the consumer, concerning which Mr. Dobbs accuses the Company of "petty shuffling and downright "meanness and——" We forbear to complete the sentence, seeing that it makes a charge which, if directed against an individual, would be libellous, though as against a Company it may not be actionable. Having read the entire document which Mr. Dobbs has sent to us, we feel called upon to remember that the statement is *ex parte*. But even without hearing the other side, we cannot fail to see that the quarrel with the Company is mainly founded on the circumstance that, having waited long for their money, they ceased to supply an article that was not paid for. Mr. Dobbs may give advice gratis; but Companies cannot so supply water. As for going to the County Court, if that plan were pursued, defaulters would be multiplied a hundredfold. We have Mr. Dobbs's own statement that the Southwark Company "claim" their water-rates about May for the first six months in the year, and in November for the latter six, whereas the schoolmaster allowed his first six months' rate to run on till Sept. 26, and his second six months, to June 9, "and it was wrong of "him." Prior to the payment of the second rate, the water was cut off, and we are told to "mind the "date," which was March 19. But March is several months subsequent to the previous November, when the second rate ought to have been paid, and is a long way after the previous Midsummer, when the supply commenced for which payment was enforced. Assuredly, there was abundant time given, and Mr. Dobbs may very properly confess that the consumer was "wrong" in falling so far behind. In future, perhaps the latter will observe the injunction which Mr. Dobbs has addressed to us, and "mind the date." But something remains to be said about Mr. Dobbs. It happens that the printed letter with which we have been favoured has a written *addendum*, and as this is unaccompanied by any intimation that it is to be considered private, we proceed to quote from it. It begins by saying: "Both of the Mr. D.'s (*vide* "your article) think that you ought to have this, in order "that you may pitch into both or either of them." There is also an intimation that if we write "a particularly "slashing article," one Mr. Dobbs will, under certain rather odd conditions, "show it to the other." We trust we are able to resist the temptation thus presented. We are more concerned to vindicate the Water Companies in the exercise of their rights, than to "pitch into" a hundred gentlemen bearing the name of Dobbs.

The annual congress of the Sanitary Institute, held at Brighton last week, under the presidency of Sir Thomas Crawford, was characterized, among other things, by an extravagant statement on the part of Dr. G. Vivian Poore, who asserted that the causes which poisoned surface wells were equally poisoning the Thames, the Lea, and other sources of the London Water Supply. "No thinking "being," he declared, "could feel easy about the water "supply of the Metropolis." We should like to ask Dr. Poore for proof of this bold and alarming statement. Sir Douglas Galton, while moving a vote of thanks to Dr. Poore for his address, took occasion to remark that "water was as great a purifier as earth," and that if they turned "refuse"—meaning sewage—into a stream, and went some few miles down, they would find that every trace of the refuse had vanished, having been taken up by minute animals, by plants, or by fishes. To this may be added the physiological test, as exhibited in the healthy condition of London. Inevitably, the microbes underwent a certain amount of discussion in the proceedings of the congress; Mr. Baldwin Latham observing that, fortunately for the human race, the majority of these minute but active creatures were the friends of mankind, and, if we could only secure their aid, they would soon destroy such microbes as were antagonistic to the general welfare. The great field of sanitary science, Mr. Latham declared, was "to culti- "vate friendly microbes" after this fashion. There is no doubt that the theory thus propounded is gaining ground. That the mere presence of microbes, up to a certain point, is no proof that the water is unwholesome, is shown by the presence of such creatures in deep-well water free from all suspicion of sewage taint, as in the case of the supply furnished to the south-east part of London and the adjacent country by the Kent Company. Concerning the merits of soft water, Mr. Baldwin Latham referred to statistics as showing that moderately hard water was the healthiest. A paper was read by Dr. Percy Frankland on lead poisoning from soft-water supplies, in the course of which it was stated that, as a general rule, water analysts devoted too little attention to the lead-dissolving powers of the waters submitted to them for opinion. In relation to this subject, all soft waters should be "provisionally viewed "with suspicion." On the sewage question, Major C. R. Conder claimed for the iron process of disinfection that it disorganized the sewage into inorganic elements. This was met by a protest from Dr. Alfred Carpenter, who condemned the iron process as destroying the sewage which ought to be applied to the land. Respecting the sewage of London, Mr. Richard F. Grantham approved of conveying the liquid to the Maplin Sands; the estimate for the work being £4,500,000—not including the cost of land and the purchase of foreshore rights. Passing from the congress to the press, we observe in *The Times* a letter from Mr. Eardley Bailey Denton, based on the conception that the London County Council must attach the drainage of the Lea Valley to that of the Metropolis, and deal with the whole upon one plan. In the *Standard* is a letter from Major Rasch, M.P., objecting to the transport of the London sewage to Hole Haven, to Canvey Island, or to the Maplin Sands. All are in South-East Essex, for which the Major is the parliamentary representative. Whither the sewage is to go, or what is to be done with it, Major Rasch does not say.

A Combined Gas Washing-Machine and Cooker.—The idea of washing linen by steam, by boiling, by means of gas, a small quantity of water in a copper tank, appears to have been long since known in Leeds. In fact, there is now living in that town a Mr. John Child, who holds the original patent for an appliance for this purpose, which he acquired from Mr. Mitchell, of Newcastle, in 1883. Mr. Child has since added several important features, until now the apparatus is capable of washing, baking, or grilling, and it can even be made into a hot oven for keeping joints warm. It has therefore been not inappropriately named the "Trinity." It consists of a square bottomless cast-iron tank with a lid, standing on four legs. To perform washing operations, an inner copper basin, cup-shaped, is let into the outer tank, and into this basin a pint of water is placed. A powerful gas-jet underneath the basin soon creates steam. A cylinder holding the soiled linen, in now put into the basin, and, being on centre bearings, it revolves by means of a handle. The lid covers the whole, and the washing of two dozen shirts is done in ten minutes. A novel movement now takes place. The small door of the cylinder is opened, and the operator turns both the basin and the cylinder over simultaneously, throwing the dirty water and the clothes into a receptacle below, and by the same movement extinguishing the gas. The washing over, the machine is carefully wiped, and the cooking commences. The cylinder and cup-shaped basin are removed from the tank, and an iron bottom plate is put in. The gas-jet plays on this plate, and the tank is at once virtually converted into an oven—the lid completing it when placed on. Mr. Child with this apparatus can cook as in an ordinary gas-oven, can carve the joint without removing it from its place, and can keep it warm for hours after turning off the gas. The grilling operation is performed by placing a receptacle immediately underneath the gas-jet; the heat being radiated by the iron plate above. Altogether, the "Trinity" machine is a novel invention; and there is no reason why it should not take with the public, if they can be induced to overcome any antipathy they may feel to washing linen and cooking food with the same appliance.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 508.)

An uneventful period in the Stock Exchange was the week which has just closed. No great movement, political or otherwise, has occurred to disturb the quietude of the vacation; and business has been at the normal rate to be expected at this season. The Gas market has pursued the even tenor of its way, with just enough buying and selling to preserve it from utter stagnation. With the exception of the variations caused by issues being quoted *ex div.* for the new account, there has been only one change in value, and that was in the upward direction. So prices generally may be noted as firm. The chief interest in the progress and position of the Metropolitan Gas industry has subsided, now that the two greater Companies have held their meetings. Gaslight "A" has been very moderately dealt in, at figures ranging from 237½ to 239¾. One or two transactions were marked in the 10 per cent. preferential issues; but the prices were rather low, being for exceptional amounts. Nothing was done in South Metropolitans, except a couple of transactions in the "B" for the new account, when good prices were realized. A solitary deal in Commercial old at top figures was all the business in that undertaking. The Suburban and Provincial list was absolutely barren. The accounts of the Crystal Palace Company for the first half of this year show a growth of rather less than 2½ per cent. in the business, coupled with largely increased expenditure; so that in the result the Company are about £5000 short of the amount required to pay their authorized dividends. Of the Foreign Companies, Imperial Continental was still the most active. The quotation rose 1; and several transactions were marked at top price, though an occasional deal was done at much easier rates. Of the rest hardly anything has been touched but Continental Union, which was very firm, and Buenos Ayres and Monte Video, which have not yet recovered from the effects of local disturbances. The Water Companies have been almost stagnant. A few changes in quotation are to be noted; and they are in favour of easier prices.

The daily operations were: Business in Gas on Monday was chiefly in Imperial Continental, which was in demand at an improvement of 1. Gaslight "A" was quiet and steady; but the 10 per cent. preferentials were not equally firm. On Tuesday Imperial Continental still led the way. Continental Unions were in demand; and Gaslight "A" was steady. Grand Junction Water receded 1. Business in Gas was much more restricted on Wednesday; and prices underwent no change. Thursday was the counterpart of the preceding day; the only alteration being the *ex div.* adjustment of South Metropolitan. Friday was equally quiet; transactions being very limited. Saturday was, of course, a very quiet day; and all quotations in Gas closed without further variation. In Water, Lambeth 10 per cents. receded 2.

ELECTRIC LIGHTING MEMORANDA.

Major Flood Page on the Fire Risks of Electric Lighting—A Startling Experience—Mr. W. H. Preece Prophesies Again.

The indefatigable Major S. Flood Page has once more written to *The Times* to ventilate an electrical grievance. This time it is the question of the rules of the Fire Offices applying to the wiring of houses for electric lighting, the discrepancies of which vex the soul of the energetic Secretary of the Edison and Swan Company, and possibly hinder him in his business. It is very difficult to understand why readers of *The Times* should be troubled with a matter of this kind, which is essentially one for the Fire Offices and electricians to settle between themselves; but it has always been the cue of Major Flood Page and his associates to treat as of general public interest anything and everything connected with the business of electric lighting which would be regarded as a private concern in the case of another industry. It is a clever idea on their part; for in this way they get a good deal of gratuitous advertisement. In the communication in question, Major Flood Page asks why all Fire Insurance Offices cannot agree to accept the Phœnix rules for wiring; and argues that the existing uncertainty as to what precautions will satisfy different offices acts as a check upon the development of private electric lighting. He assures us as an admitted fact that a house lit by electricity is safer from risk of fire than if lit in any other way, provided that the wiring is perfectly done. Unfortunately, it is in settling this provision that the trouble arises. Major Flood Page tells the public that, if their houses are properly wired, they can be lighted with electric lamps in perfect safety. He is not the first person who has found, as Touchstone says, "great virtue in an *if*." In advocating the agreement of the Fire Offices upon some programme for the prevention of uncertainty in such an important matter, Major Flood Page incidentally referred to Mr. John B. Verity; and next day Mr. Verity improved the opportunity by writing a long letter to state his views as a contractor. He does not wholly approve of the Phœnix rules; and invites the Institution of Electrical Engineers to frame a fresh set, that may in time be accepted by the Board of Trade. Experience of the adoption by the Board of Trade of rules applying to electrical work does not, however, warrant the belief that, if Mr. Verity's aspirations were gratified, electricians would be in perfect peace.

Municipalities hankering after a public electric lighting station, out of the profits of which, as Mr. W. H. Preece lately told the St. Pancras Vestry, they may hope to obtain a subsidy in aid of the rates, may be directed to study the example of Trient, in Austria, as recently described in the *Electrical Review*. In this favoured locality there was ample water power, which only needed to be appropriated; and the Municipality entrusted the work of equipping the station to the firm of Siemens and Halske. The town has a population of about 20,000; and the original estimate of the cost of the electric lighting works was 210,000 florins, or nominally £21,000. The actual expense, however, has been 500,000 florins, or £50,000; and this is to be increased by another 150,000 florins for tapping some lakes, in order to assure the permanence of the water power when the river originally laid under contribution runs low. The total capacity of the central station is 6000 incandescent lamps, which will therefore cost 650,000 florins (£65,000). Over and above the street lighting, the Municipality obtain from lamps supplied a revenue of 28,800 florins; but the annual expenditure, including capital allowances, is 62,275 florins. The unhappy Trienters have therefore to find by way of rates the money to make good the deficiency of 33,475 florins (£3347 10s.), which has to be charged to the account of public lighting. A noble sum to pay for the public lighting of a country town of 20,000 inhabitants! Hitherto the city has paid for public lighting 10,600 florins, for gas and petroleum. The town is thus saddled with threefold the cost for public lighting that it formerly paid, although it is by no means a wealthy place. The comment of the correspondent of the *Electrical Review* who supplies these particulars is remarkable. "Surely, many a city may take an example and indulge in a luxurious system of lighting!" There is no accounting for opinions. We should have thought that the example would have been cited as a deterrent rather than otherwise, or at least as an illustration in point of the adage, "Look before you leap."

At the Sanitary Congress which met last week in Brighton, Mr. W. H. Preece lectured on electric lighting, which was a somewhat bold thing on his part, seeing the peculiar figure he played but a short time since in connection with the killing of a man by the local Electric Light Company. This particular lecture was supposed to be upon the sanitary aspects of electric lighting; but the term "sanitary" is very comprehensive, as interpreted by the Congress; and so Mr. Preece was allowed to talk very much at large in his old familiar strain. He argued that "electricity and light being analogous and indentical forms of energy, the former was naturally the proper source of artificial illumination." This is the report given by *The Times;* so that we are not responsible for stating the lecturer's argument in a style that contains an absurd *non sequitur*. What has the analogy or identicality of one form of energy with another to do with the practical and commercial question of artificial lighting? As well might Mr. Preece argue that, because heat and motion are mutually convertible, the proper way to strike a light is not by the indirect although confessedly cheap and handy match, but by the firedrill of the Melanesian savage. Of course, Mr. Preece prophesied that eventually electricity must supplant every other form of lighting. Prophecy is cheap padding for a popular lecture, and always conveys the impression that the prophet must know more than other people, and be altogether a superior kind of person. Those who are not dazzled by Mr. Preece's powers of talk, are inclined to think, however, that he would stand a far brighter chance of handing his illustrious name down to an admiring posterity if he would condescend to do something towards the realization of his own predictions, instead of lecturing and writing papers on the subject. In electric lighting, as in everything else, it is not the man who stands aside and talks of the good time coming who really moves the machine; but the quiet worker of whom little is known abroad until his work is done.

Death of Mr. Swain Rhodes, of Accrington.—We regret to record the death of Mr. Swain Rhodes, Chairman of the Accrington Gas and Water Company, which took place at his residence in that town last Friday morning, after a lingering illness, at the age of 66. He had been a Director of the Company for 36 years, and Chairman since 1866. Under his management, the Company has been most successful; and he devoted considerable time to the duties of his office.

The "Directory of Registered Telegraphic Addresses," compiled by Mr. Henry Sell, a copy of the ninth issue of which has been courteously forwarded to us, claims notice in these columns from the fact that the "registered telegraphic address" has now become a necessity with all business firms of any pretensions. The present volume contains 20,000 addresses—something like 8000 more than its immediate predecessor; and when it is stated that these have been obtained entirely through the energy of the compiler and his staff (the Post Office officials persistently refusing to render him any assistance), the labour involved may be easily appreciated. The utility of the work is enhanced by the inclusion of a telegraphic code, and an appendix for special phrases for individual wants. The book is published by Sell's Advertising Agency, 167 and 168, Fleet Street.

THE WATER-GAS EXPERIMENT AT HARROGATE.

The promoters of the British Water Gas Syndicate, of Leeds, have now fairly entered the field as competitors with coal gas. Their first attempt at public lighting has been made at Harrogate—hitherto more renowned for its mineral water than water gas—and, it must be acknowledged, with a certain amount of success. Why Harrogate and not London was selected for the field of battle will easily be understood when it is stated that Mr. Samson Fox is the Mayor of that borough, besides being the moving spirit of the Syndicate. The place, the time, and official assistance gave advantages which London could not offer; and so it was that, as already recorded in our columns, water gas entered the lists for public street lighting on the 6th ult. It should be known, however, that this event, which is of some importance to the gas industry, has not been suddenly thrust upon the public of Harrogate. There were others to be considered—viz., the Harrogate Corporation and the Harrogate Gas Company, more especially the latter, who possess parliamentary powers to restrain adventurers from interfering with their rights. Of course, the Harrogate Corporation were not difficult to deal with; for the Mayor and his friends were in thorough accord. The Gas Company were first approached for "permission" to light the public streets so far back as the 6th of February last. Since that date much correspondence has passed, and a lengthy interview has taken place, between the Directors and the Corporation. The former very naturally wanted to know how many and where the public lamps were to be placed; what streets were to be opened; what interference with their mains would occur; and what infringement of their parliamentary powers was proposed. After all these things had been adjusted, the Company, with the fairness which characterizes them, determined to receive their opponents in as friendly a manner as possible. At length the Directors came to a decision on the matter, and passed a resolution, which was accepted by the Corporation. They consented to the application of the Town Council to be permitted to consume water gas in the public lamps in Parliament Street for three months; but they stipulated that the Corporation should not sanction any action whereby the statutory rights of the Company might be prejudiced, as whenever water gas could be supplied with safety at a lower rate than coal gas, the Directors would give the public the benefit thereof, under their existing powers, by themselves undertaking its manufacture. The resolution contained the necessary clauses for the protection of the Company's property; and it closed with the offer on their part to afford all reasonable facilities which would be lawful under their Act, for carrying out the experiment, and keep a supply of gas ready in case of any failure of the new illuminant, or desire on the part of the Water Gas Syndicate to discontinue the lighting before the specified period. This resolution was really the basis upon which the latter people were to commence operations. The plant was duly erected, and the several services laid; and the public lamps were lighted for the first time on the above-mentioned date. No expense has been spared by the Syndicate, in order that their gas shall make a glowing *début*. They fairly and squarely stated that they were powerful rivals to coal gas; and they raised the curtain under the most favourable circumstances.

Nearly a month has elapsed since the inauguration of the experiment; and we allowed the preliminary excitement to cool down before dealing specially with the matter. Last week, however, a representative visited Harrogate to see for himself the value of water gas as against coal gas. He went with a perfectly unprejudiced mind; saw all parties; and learnt what the public had to say about it. The result of his investigations leads him to the conclusion that water gas will not, for many years to come, rival the old, tried, and trusted servant. It must be admitted that the lighting by water gas is beautiful; but until the difficulty of carburetting is overcome, the expense of the magnesia "combs," which are an indispensable adjunct, will block the way. These combs are so frail that the lamps have to be lighted carefully by hand, to prevent their breaking or being blown off by explosion. Again, the comparison of the lamps themselves is not fair to the ordinary gas-lamps. Those in which the water gas is burnt are beautifully got up, costing probably six or seven times as much as the ordinary lamps. Then it is stated that the Harrogate Corporation have not made any attempt lately to clean these ordinary lamps; so that they present a sorry appearance against their gilded opponents. The whole question becomes narrowed down to one of expense. There is no denying that the water-gas display at Harrogate is that of a brighter lighting agent than coal gas, though one which is dangerous in use for indoor consumption; but we must see the bill. On authority we were told that water gas costs 1s. 4d. per 1000 cubic feet at the burner, when consumed on premises contiguous to the place of manufacture. If this be so, let the Leeds Water Gas Syndicate offer all corporations in England a supply at this figure—especially those who profess to sell at cost price—and we shall be satisfied. Moreover, if this is done, we can reasonably advise the Harrogate and all other gas companies to add water-gas plant to their works, and make this illuminant the future competitor with electricity.

The water-gas plant has been laid down, at a cost of £1000, in the Montpellier Gardens, the use of which has been allowed by the Corporation. It consists of a generator, scrubber, gasholder, blower, governor, odorizing apparatus, and boiler; and the whole is placed within the space of 40 feet square. The valves and appliances are worked simpler than at Leeds Forge. In order to fully demonstrate the luminosity of water gas, the Mayor has, as we have said, put down a main and fixed pillar lamps on both sides of Parliament Street, between those of the Gas Company. At the top of Parliament Street and at the junction of James Street, a large 400-candle power lamp is fixed. In this there are 24 jets; but the lamp is capable, it is said, of giving an illuminating power of 800 candles. The water-gas plant, which is worked by a man and two boys, is under the charge of Messrs. Teesdale and Roberts; while Mr. Owens, the Secretary of the British Water Gas Syndicate, pays daily visits. The burners used in the lamps are two of Bray's No. 3; and each is surmounted by a small comb, consisting of magnesia rods suspended by a wire. The flame renders these rods white hot; producing an intensely bright light. With a consumption of 3 cubic feet of gas per hour, the combs give a light equal to 22 candles. The colour of the light is white, with a very slight tint of blue. It is said the combs last 100 hours, and cost about 1½d. each; but this is open to question. The lamps are labelled, so that the public have an opportunity of judging of the respective merits of both systems used in this particular street. Another feature of this gas is that the light, by means of the incandescent comb, is more agreeable, on account of its whiteness and perfect steadiness, than the ordinary gas-flame, as the arc of the glowing material is larger, and the colour of the light better; further it is less trying to the eyes than the incandescent electric light. Against these advantages, there is going on in Harrogate a demonstration of the effect of the deleterious gases produced during the charging of the generators; and the proprietor of one establishment in Parliament Street states that he and his assistants are suffering considerably. This is unfortunate, and will have to be remedied.

While dealing with this matter, we would strongly advise people to keep themselves calm. The excitement caused at Harrogate by the introduction of the water gas has by no means cooled down; and the relations between all parties are becoming overstrained. The placarding of the public lamps with "Water Gas" and "Coal Gas" is quite sufficient to enable the public to judge of the respective merits of the two gases. It is asserted that the services of several gentlemen in the Harrogate hotels have been enlisted to sound the praises of water gas. This is not needed. Again, the consent of the Gas Company was for the use of the gas for "public lighting;" but the officials of the Water Gas Syndicate, as our readers are aware, commenced supplying the stage at the Spa, the proprietors of which have really become "consumers." Permission for this could easily have been solicited from the Gas Company; and it should have been done. The Gas Company have, we understand, remonstrated with the Corporation with respect to the Spa lighting and the dirty condition of the street lamps. We should regret to see enthusiasm lead parties into the Law Courts. It is entertaining to witness the *furore* with which the water-gas people are demonstrating; and if there is anything in their system, so much the better for all parties interested in the future of gas lighting.

Mr. J. S. Pickering, Manager of the East Warwickshire Water-Works, has been appointed Engineer and Surveyor to the Nuneaton Local Board. The duties of the new office will not necessitate the relinquishment of his present position.

The Gas Managers' Association for North Wales.—We learn from Mr. J. Smith, of Bangor, the Honorary Secretary of the newly-formed Association of Gas Managers for North Wales, of which Mr. H. Woodall was elected President, that the project has fallen through, owing to the number of managers in the district who would be prepared to assist with papers being too small to justify the Committee in going on.

Failure of the Fuel Gas Scheme in St. Louis (U.S.A.).—According to the *American Gaslight Journal*, the experiment which Mr. Emerson M'Millin, President of the Laclede Gas Company of St. Louis, instituted a short time since for the supply of fuel gas in that city has been a failure. The result of the project was eagerly looked for, as he was very well placed for trying the experiment, seeing that his Company had acquired by purchase the plant and mains of the local Water Gas Company, and that he was as well acquainted with the theory and practice of fuel gas supply as any man in America. It was intended to supply a non-carburetted water gas at a very low rate, and the scheme was to have been started on July 1 last. The supply was in reality begun on the 14th, only to be discontinued on the 31st of that month. But 16 applications were received; and the outlook was so unsatisfactory that the proprietors determined to end an attempt that promised nothing but disaster. Commenting on the matter, our contemporary said: "The failure at Louisville, where the initial conditions were quite similar to those at St. Louis, followed so closely by a like ending at the latter place, only emphasizes the position taken by the *Journal* in respect to the problem of a fuel gas supply. We have always believed that its solution lies in an intelligent use of illuminating gas both for lighting and cooking purposes."

THE DISTRIBUTION SYSTEM OF THE GASLIGHT AND COKE COMPANY.

VERY few engineers outside London, we believe, have a clear conception of the extent of the distribution plant of The Gaslight and Coke Company, or of the enormous amount of incessant work required to keep it in order and adequately charged with gas in every part. It is only by methodical procedure, and by the whole of the operations being centred in one head, that this is effectively accomplished. The chief of this important department is Mr. G. F. L. Foulger, on whom devolves the responsibility of seeing that nearly 70 square miles of the Metropolitan area are properly supplied with gas; and it is to him that we are indebted for the information embodied in this article.

The gas is controlled by Mr. Foulger from the time it leaves the manufacturing stations, which are eleven in number, and are located at Beckton, Bromley, Bow Common, Shoreditch, Haggerston, St. Pancras, Fulham, Kensal Green, Nine Elms, Pimlico, and Silvertown. Beckton gas practically supplies nearly one-half of the Company's district; and for convenience of storeage, it is transmitted to holders at nine of the other stations—the two excluded being Kensal Green and Silvertown, each of which has a distinct district valved off for its own make of gas. Although these districts are kept entirely separate—and this is a very important matter—in order that each of the works shall supply its fair proportion of gas, there is a system of high-pressure mains, which traverses the whole district, and by means of which any one works can be assisted by any other. Supposing, for instance, that St. Pancras is short of gas, succour can immediately be afforded, by Mr. Foulger giving directions for a supply to be pumped from any works storing Beckton gas, and which may have a superfluity at the moment. This operation is known among the staff as "ringing the changes;" and in the winter time "ringing the changes" on districts has frequently to be performed. To work this system of "changes," there are no less than 800 valves. The area is also divided into what are called "transfer districts," which are all separately valved, and which can, according to requirement, be put on or taken off from the works to which they legitimately belong. Of course, during foggy weather in winter, this is repeatedly done. In addition to this, there are valves between the various districts, by which in cases of emergency the whole can be opened up, and made into one large district. It is very essential, however, on account of the variations in level, that the district for ordinary working should be valved off. Take Hampstead, for instance, which is 400 feet above high-water mark at the London Docks, if this were not done an enormous pressure would be obtained there, to the detriment of the low-lying districts.

There is telegraphic communication between the whole of the Company's works and district stations; and every hour of the day and night the amount of gas in stock and the next estimated hourly make at each works is made known to the Goswell Road office, from whence all orders respecting the distributing system emanate. The figures are immediately registered, together with the state of the barometer and thermometer at the different works. Upon these returns (which, by the way, are carefully verified by being repeated) Mr. Foulger forms an opinion as to whether it is necessary to do anything towards shifting the districts, opening up supplies between districts, or taking over any of the "transfer districts." Of necessity, this all calls for very close attention on his part during the cold and foggy winter months. When a heavy fog suddenly arises, the situation has to be grasped without any loss of time; and to obviate trouble and delay, it is occasionally necessary to send men in cabs to open up supplies on the districts. The telegraph wires are also employed to give instructions to those in charge of the valve-houses regarding the different pressures to be worked. At times during the winter, the pressures have to be changed almost hourly, according to the state of the weather—especially during the prevalence of fogs. Directions as to the pumping of Beckton gas are likewise despatched to the different stations by means of the wires; and here we have an illustration of the necessity for the whole of the arrangements being centred at one point—viz., that it not infrequently occurs that some of the works require to pump gas when others are actively pumping; and therefore by the operations being controlled from a centre, serious trouble, which otherwise would arise, is averted.

At London Fields, Canning Town, Blackfriars, and Goswell Road, districts are supplied direct without any local gasholders whatever; the supply being taken direct off the high-pressure mains. For example, the high-pressure mains from Beckton contain a pressure varying from 60-10ths to 180-10ths. In order to reduce this to district requirements, the gas is passed through governors; and the pressure-registers are constantly watched to see that the pressure is adequately maintained. These are what are called the initial pressures.

Throughout the Company's area, pressure-registers are fixed which go by clockwork, and which give a continuous record like a barometer chart. These registers are in a glass case under lock and key, so that they cannot possibly be tampered with. There are about 70 of these; and the registration cards are forwarded every morning to Goswell Road to be examined and checked, and what is registered by them acts as a guide in determining the pressures during the following night. Pressure-registers are also fixed at what have been found to be the lowest points in the area of supply with regard to pressure. These points are ascertained by an annual pressure-taking, which is thoroughly carried out. A lamp-post is selected in an important thoroughfare, the governor is removed, and a pressure-gauge placed on the top; and thus the pressure at that point is determined. Practically the whole of the district is gone over in this manner; and careful record is kept of the sizes of mains each pressure is taken from. For this work one of the heaviest night's consumption in the year is selected—generally towards the latter end of December; and by this means all those points of the district which may be considered as low are unearthed. Upon the record thus produced, Mr. Foulger bases all his calculations for extensions and alterations of mains and connections, to remedy any difficulty that may be discovered coming on, and which, if neglected, would tend to bring the Company below the parliamentary standard in regard to pressure. At different places in the area, registers are permanently fixed which give the minimum pressures. The whole of these are taken to Goswell Road, and checked and examined with the initial pressures—due regard being, of course, paid to the anticipated reduction by consumption.

At the Goswell Road office, there are some very interesting maps. On one large map is depicted the Company's extensive area, which, as before mentioned, covers close upon 70 square miles, and in which they have something like 2000 miles of mains in active operation, excluding service-pipes. The area extends from about 2 miles below Woolwich on the north side of the Thames to Twyford (excluding the small portion round Stepney supplied by the Commercial Gas Company); from Wandsworth on the south side of the river to Kingsbury and Hendon on the north; and from Fulham to the district of the Tottenham and Edmonton Gas Company. It comprises no less than 115 City parishes; and 68 Metropolitan and Suburban ones. In the heavy days in winter, such as during a fog, this district requires an enormous bulk of gas—approaching 120 million cubic feet daily. The storeage capacity being hardly equal to a day's consumption, it is, of course, a matter of considerable anxiety when dark weather prevails to keep the district properly supplied. In fact, so much gas is then used during the daytime that it is no uncommon thing for the Engineers to find that, instead of adding to their resources to meet the night consumption, the stock falls lower every hour of the day. The public lamps in the district, it may here be mentioned, number about 50,000; and these are lighted at the rate of something like 1000 per minute.

The map referred to in the preceding paragraph forms an index to 111 maps on each of these scales—viz., 3 and 5 feet to the mile. One set is always open for ready reference; and the other is kept in a fireproof room. On these all the Company's mains are shown in full detail; with the position of each valve, syphon, and connection marked. Every new extension, however small, is also carefully inserted. On a requisition from a district for a supply of gas, before an extension of mains is sanctioned by the Chief of the Department, the matter has to be thoroughly investigated. The pressures are taken into consideration at that particular point, to ascertain whether the existing mains can bear the proposed extension, as it may be necessary to lay a longer length of main in order to get a supply from a main farther off which is capable of bearing the strain. With an extensive system like this, it is of the highest importance that all projected additions should be properly examined, because the district to be newly supplied might be miles away from any gas-works; and if it happened to be situated on high ground, unless due care were exercised, it would drain the gas from the area through which the main passed.

The Company have a large number of mains in subways, which are inspected daily; and also several exposed on bridges (all painted to protect them from rust), which are examined two or three times a week. The laying of all large pipes is personally supervised by Mr. Foulger, who also devotes his attention to everything relating to the trunk mains, the pressures, the remedying of escapes, the renewal of supports under mains in subways and on bridges, seeing that the examination three times a year of the 800 valves in use in the district is properly carried out (so that they may be ready for immediate use in cases of emergency), and also the making and transferring of districts from time to time. From every part of the area, information is daily wired to Goswell Road, regarding works in progress affecting the distribution system—not only of work being carried out by the Company, but every description of road work, so that it may be watched and inspected to see that any ground which has been excavated over or near the gas-mains is properly reinstated, and the pipes thoroughly bedded up.

The system followed by the Company in searching for leakages of gas has proved very effectual. They do not wait for escapes to "turn up," but they employ a staff of men to traverse the whole line of big trunk and high-pressure mains to search for them. Every water and syphon box and gulley hole, and every other opening in the ground, is examined and tested by means of an indicator. This is extremely important, because a leakage from the high-pressure mains would naturally be very much greater than from an ordinary district main. A large number of men are kept whose duty it is to examine and pump the receivers and syphons, and take out the condensed vapour from the gas. The lamplighters also are provided with books, in which, as they

perambulate their respective districts twice daily, they note anything which strikes them as being of an unusual character. All the outdoor men are likewise instructed to report any escape of gas, &c., which they observe; and the police, if they perceive a smell of gas, notify it to the nearest district office, of which there are nine. As already remarked, this system of procuring information concerning escapes has been very effectual, as is evidenced by the results of the half year ending June last. During that period, although 4232 escapes of gas were discovered and remedied, there was not a single case in which compensation had to be paid on account of explosion. This speaks well for the diligence displayed by the men; and shows that their labour is not lost. It may be added that at each distributing station trucks fitted with every necessary appliance for immediately dealing with leakages are kept ready for instant despatch, and with the alacrity of a fire-engine.

This article would not be complete without a brief reference to the variety of office-work which necessarily occurs in this gigantic undertaking. In the first place, all the foremen's sheets from the different districts are examined and initialled. The whole of the pressure returns are carefully scrutinized and checked. An examination is made of each escape-notice sent in, which shows the way the leakage has been temporarily stopped during the night; and immediate steps are taken to substantially and permanently repair the faulty pipe or main. Then, preparatory to the opening of ground, notices are sent to the Vestry interested. Cases of emergency—such as escapes of gas, &c.—are received and have prompt attention, night and day. Returns are thoroughly checked to see that all new syphons are properly taken account of, as the omission of even one syphon would produce water-logging of a main, which, of course, would cause the lights in the district to jump, and would eventually be the means of extinguishing them altogether. The summaries of work done by the men are examined; and also the accounts against contractors, &c., for alterations. The lists specifying the various stores available for cases of emergency and the places where they are situated undergo constant examination. The entries in the receiver books are checked to ascertain that the receivers have been periodically dipped and pumped; and the bridges and subways books undergo regular scrutiny. In addition to the foregoing, there is the work attached to the continual receiving and despatching of telegraphic messages which has already been referred to.

Iron and Steel Institute.—The American meetings of this Institute have been finally arranged, and a large number of members and their friends will leave this country for New York early in the present month. The week commencing on the 29th inst. will be devoted to the reading of papers and discussions by members of the American Institute of Mining Engineers and the English Iron and Steel Institute; and on the 9th prox. and the two following days, these two bodies will promote an international meeting at Pittsburg. Afterwards excursions will take place to the iron ore and copper regions of Lake Superior, and to the new iron-making district of Alabama. Altogether, the American Reception Committee will provide sleeping and luncheon cars to take their visitors over 3000 miles of the States.

The Purification of the Seine at Paris.—A work of some difficulty is now being undertaken with a view to purifying that part of the River Seine which flows through Paris. At present the water is badly contaminated, not only by the drains which find an outlet on both the right and left banks, but also to a very considerable extent by the drainage of Ile St. Louis and the Ile de la Cité. It is in order to purify the river as much as possible that a double conduit is being laid down in the bed, to convey the drainage from the islands to the big collector near the Pont de l'Alma. This conduit is constructed of sheet iron, and has a diameter of about 20 inches. It is placed in a bed dug in the bottom of the river, and is protected by a thick coating of cement. The material is prepared on pontoons, is placed in large iron receptacles, and is sunk to the bottom of the river. The receptacles are then opened by divers; and the cement is placed over the conduits. The work will be completed very shortly. Another conduit, similar in construction, will then be begun between the Ile de la Cité and the collector at the Pont de l'Alma.

South-West of England District Association of Gas Managers.—The usual half-yearly meeting of this Association is arranged to be held at the Royal Hotel, College Green, Bristol, next Tuesday. By the courtesy of the Chairman and Directors of the Bristol United Gaslight Company, the gas-works at Stapleton will be open to the inspection of the members. The business meeting will commence at one o'clock; and the programme includes, in addition to the usual routine business, a paper by Mr. S. W. Durkin, of Southampton, entitled "Notes on Purification;" a description of a method of deodorizing foul lime by Mr. Robert Beynon, of Torquay; and a paper on "Recent Designs of Hydraulic and Foul Main," by Mr. Norton H. Humphrys, of Salisbury. These, with the usual discussions, will fully and profitably occupy the time allotted to the meeting; and at the close the members and friends will dine together. We are asked to state that the city will be unusually full on the evening of the 9th inst., on account of the annual leather fair; and consequently those who intend to remain over the night will do well to arrange for accommodation beforehand.

COMMUNICATED ARTICLE.

THE VALUATION OF GAS-WORKS FOR ASSESSMENT.

By Thomas Newbigging, M. Inst. C.E.

II.

It is laid down by the Legislature that all rating shall be equal; and that it shall be on the rent of the hereditament—not on profits in trade derived from the use and occupation of the same. In the instance of public undertakings such as railways, canals, water-works, and gas-works, the owner or landlord is generally also the occupier or tenant, so that no rent is actually paid. Or if there does happen to be a tenant in occupation, he holds the works on a lease for a term of years, and not "from year to year." Therefore, to comply with the provisions of the statute, a hypothetical or imaginary tenant is introduced. The same thing occurs with house property when occupied by the owner; but in cases of that kind it is easy, by comparison with other similar dwellings, to determine the rental value. So with cotton, silk, lace, and other factories occupied by the owners engaged in the general trade of a district. In order to ascertain at what annual rent a tenant might reasonably be expected to take a gas undertaking—not on a lease for a term of years, but "from year to year"—it is necessary first to find what is the gross income arising from the hereditament; then the expenses consequent on the working. The one being deducted from the other, there is left the net receipts. These net receipts constitute the fund out of which the landlord's rent and the tenant's profits are to be supplied. In other words, the net receipts are to be divided between the landlord and the tenant; and the next point to be settled is the tenant or occupier's share of the net receipts. This is done by fixing the amount of capital which he would require to enable him to work the concern. This would include a proportion of the year's expenditure; the value of the coals in stock, and other necessary stores of all kinds; the value of the chattels, such as tools and implements, office and laboratory furniture, and meters on hire; and, finally, a proportion of the annual rent which he had agreed to pay. On the sum of the tenant's capital thus ascertained, interest at the rate of 5 per cent. is reckoned; then 10 per cent. for trade profits, and 2½ per cent. for risks and casualties—making 17½ per cent. This percentage, calculated on the tenant's capital, gives the tenant's share of the net receipts; and which, deducted from the same, leaves the "Gross Estimated Rental," or "Gross Value"—that is, the yearly rent which the tenant would pay for the beneficial occupation and use of the hereditament. Then come the statutable deductions on the landlord's account for the imperceptible depreciation of the property, consisting of an annual amount assumed to be set aside, and invested at compound interest for the purpose of the renewal or reproduction of the hereditament—the buildings, apparatus, plant, and main-pipes—at the end of a certain period answering to the average life of the whole; another amount for the renewal of the tenant's fixtures or chattels; and an allowance by way of insurance. The sum of these being deducted from the "Gross Estimated Rental," leaves the "Rateable Value" of the whole. After this follows the apportionment of the rateable value among the different parishes or townships in the Union—assuming there are more than one—in which the works or manufacturing stations are situated, and through which the mains extend; the latter according to the gas-rental in each parish or township.

Such is, in brief outline, the process adopted for arriving at the assessable value of a gas undertaking; later on I shall give a practical example, and treat the different points in further detail. In the meantime, although we are not concerned either to justify or to find fault with the recognized method of assessing such works, but rather to indicate the procedure rendered logically necessary for carrying out the statutes and the authoritative decisions, it will be well to notice some of the objections that are raised to the present mode of assessment.

It has been argued that the gross or rental value of gas-works should be ascertained in a manner similar to ordinary house and mill property; that is, by taking the structural cost, and calculating a percentage thereon. I cannot agree with this view; and have never heard it justified by any substantial reason. Under such an arrangement, many works would fare worse than they at present do. Possibly this may be owing to their assessments being too low; but whatever the cause, it would be less satisfactory than the present method. It might hit the mark in some instances; but in the majority it would be unfair either to one side or the other. The cases differ materially. In the instance of a factory, for example, the profits which a firm or a company may make in such factory by the trade they pursue therein do not determine the rent of the factory except to a strictly limited extent; nor should they. It is rather the capital which the owner may have expended on its erection. It would not be just either to the occupier or to the Union to make profits the basis of valuation, because these are subject to fluctuation; and, indeed, during some years—if such a principle were adopted—there would not be any taxes payable, inasmuch as, through competition, bad trade, or mismanagement, there would not be any profits made.

The case of a statutory gas undertaking is different. It is generally an easy matter to forecast the profits; for, happily,

profits are nearly always a matter of certainty here—hence the steadiness of gas property as an investment—because the company has a virtual monopoly of its district under parliamentary sanction, and is therefore not troubled by competition, if we except that of oil and the electric light. It is true there are also statutory restrictions in the Special Act, or in the General Acts incorporated therewith, as to price, illuminating power, and purity; but the effect of these is really not disadvantageous, as they tend to maintain the undertaking in a condition of stable equilibrium. Certainly the restrictions are not so exacting as to prevent a company under reasonably good management from earning its statutory dividend. It is clear, therefore, that in a case of this kind the rent which a tenant would pay for the concern would be greater, as a general rule, than would be paid for any ordinary works on which an equal amount of capital had been expended, when competition introduces an element of uncertainty into the amount of profits to be earned.

But even in ordinary mercantile enterprises that are subject to severe competition, profits do, to a certain extent, regulate rent (though in an indirect way), and consequently the amount of the assessment. In times of prosperous trade, rents of houses, shops, and factories rise by reason of the profits that can be made. Hence the rateable value of the district increases beyond the simple proportion of the growth of population, and diminishes in less propitious times—though not usually to the like extent, it must be admitted, unless the period of depression is long protracted. There is an element of value in steadiness (which is generally synonymous with safety) distinct from the actual percentage of profits secured. Gas-works property possesses this quality of steadiness which makes it desirable as an investment. It is clear, then, that to take a percentage usually reckoned on ordinary property would not always represent the fair rent of a gas-works; and therefore an assessment based upon such an ascertained gross rental value would not in many instances be an equitable assessment.

If the rent of real property is to be taken as the basis of assessment, as, according to law, it must be, it is evident that such rent—the rent of a gas-works—can only be arrived at through the medium of the profits. It is folly to assert, as some do, that the present system of valuing such works results in an assessment of profits pure and simple; that the method of rating gas-works is a reversal of the doctrine that it is rent and not profits which should be the subject of the rate; that the hypothetical tenant is responsible for this inversion, or perversion, of the true principle of rating; and that no satisfactory solution can possibly be attained until that obnoxious individual is got rid of. The hypothetical tenant is the "skeleton in the cupboard" of the assessment reformer; and when he is trotted out, he is as much looked on askance as a real skeleton or sheeted ghost would be. All this involves a fallacy. The rental value of a gas undertaking is dependent on, and controlled by, the profits realized or realizable; and hence the necessity of determining the profits before the rent can be fixed. When an assessment is deemed to be high—assuming the valuation to be properly made—it is really only a proof of the capacity of the works as a profit-bearing undertaking.

Supposing, again, a person having the opportunity of taking a gas-works on lease, and being willing to do so, the very first thing he would try to ascertain would be the actual or possible profits; in short, the rent which he would pay as tenant depends on what profit he would be likely to make. Rent, therefore, is the basis of rating; and so long as it continues to be so, if justice is to be done in the case of undertakings of a public character, the hypothetical tenant is a necessity.

(To be continued.)

The Welsbach Incandescent Gas-Light.—The Directors of the Incandescent Gas-Light Company, who, as our readers are aware, have been effecting some important changes in their system of business, have recently issued an illustrated pamphlet setting forth the improvements they have made in the appliance with which they are identified. As now supplied, every lamp is fitted with a governor, which ensures a constant consumption of gas, no matter how the pressure may vary, prevents hissing and bubbling, and guarantees complete combustion by mixing the air and gas in due proportions. The new burner is of much more ornamental design than the old pattern, and is said to give better results in every respect. The "mantle" is now supported by a clay ring, which, being a non-conductor of heat, prevents the wire rod from oxidizing and bending—a defect which often resulted in the destruction of the mantle. The mantles are now made in such a way that they can be sent by post to any distance. The form in which they are supplied enables customers to have spare ones for renewal, instead of sending back the lamp each time a renewal is required; and they can be kept any length of time, without deterioration, before being used. An improved form of chimney which has been introduced, reduces to a minimum the danger of breakage. The Directors are prepared to deal liberally with those who have in use lamps of the old pattern; for they state that they are willing to exchange them for those of the new kind at a very moderate rate. We understand that 200 Welsbach lights are being fitted up at the Army and Navy Stores; and the Directors have other large orders in hand.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

A large number of members of this Institution assembled at Lancaster last Saturday, for the eighty-third quarterly meeting. A few well-known faces were missing—a fact to be accounted for by the demands which are now being made on individual arrangements by the holidays; but the meeting was nevertheless representative in its character, and thoroughly enjoyable.

The members from the South and East of Manchester assembled at the Exchange Station in that city, and travelled in specially reserved carriages attached to the train leaving at 10.20 a.m. On their arrival at Lancaster they were met by Mr. Charles Armitage, the Engineer and Manager of the Corporation Gas-Works, Mr. W. Duff, Manager of the Morecambe Gas-Works, Mr. J. Swan, Manager of the Ulverston Gas-Works, and other gentlemen, including some who had travelled from the North. Amongst the latter was Mr. Joseph Hepworth, of Carlisle, the President of The Gas Institute.

The party proceeded first to the King's Arms Hotel, where luncheon was served. A visit was next paid to the gas-works; Mr. Armitage acting as guide. The chief interest centred in the portion set apart for the distillation of tar and the manufacture of sulphate of ammonia, in both of which Mr. Armitage has achieved remarkable success. The gas-works are situated near the banks of the Lune—a navigable stream—and are connected by a siding to the railway, which runs near. Lines of rails are carried through the retort-house on each side of the beds; and the coal and cannel are thrown from the trucks at a convenient distance for firing. The tar and ammonia works are close by. In the course of a brief statement, Mr. Armitage said the process in use for the distillation of tar was like that generally adopted. It was a question of fractional distillation; and they looked for results in pounds, shillings, and pence. All the tar produced at the works was distilled, in addition to a small quantity bought in the neighbourhood; and various products were obtained, besides which they prepared a small quantity of tar for making asphalte and black varnish. The annual report of the Gas Department (an abstract of which appears in another column) showed that they realized last year for tar and ammoniacal liquor 5s. 6½d. per ton of coal carbonized. In other words, tar realized 3s. 4d. per ton of coal, which was equal to 3d. per gallon, or £2 8s. 9d. per ton of tar, less labour and fuel. The average would have worked out at a slightly higher rate but for the tar prepared for asphalting purposes, &c. The ammoniacal liquor manufactured into sulphate brought 2s. 2d. per ton of coal carbonized. In order to show the kind of products made, and the quantities and the prices obtained, he had tabulated the information as follows:—

Products from One Ton of Tar.

Description.	Gallons.	Spec. Grav.	Quality.	Percentage.	Weight.	Price.
					cwt. qrs. lbs.	s. d.
Crude naphtha }	10	·913	17 p.ct. at 120° C.	4·06	0 3 7	1 0
Light oil	18	·983	60 p.ct. at 200° C.	7·90	1 2 9	0 5
Creosote.	53	1·045	..	24·69	3 21	0 2½
Pitch. .	..	..	soft medium	59·77	11 3 23	26 0
Water .	5	1·030	4 p. ct. NH_3	2·28	0 1 23	15 0
Anthracene }	..	..	34 p. ct. $C_{14}H_{10}$	0·38	0 0 13	1 0 / p. unit
Loss . .	..	..	..	0·72	0 0 16	..

Amounts per ton: Crude naphtha, 10s.; light oil, 7s. 6d.; creosote, 11s.; pitch, 15s. 6d.; water, 6d.; anthracene, 4s. 6d.—total, £2 9s.

They had thus realized £2 9s. per ton of tar, less labour and wear and tear; or, allowing for the quantity sold for asphalting and black varnish, the amount would be about £2 9s. per ton net. As he had said, it was a question of fractional distillation; and the first fraction was up to .925 specific gravity, at which they had crude naphtha; and from ·925 to 1000 they had light oil. Creosote was taken out from this point until the distillate set on a plate; and anthracene was obtained after that up to a specific gravity of 1120. The production of sulphate of ammonia was 32·20 lbs. per ton of coal carbonized. The apparatus was an ordinary still of the old style, in which the liquor was boiled, and an open saturator. He claimed for this, that it required less skilled labour than any other system in use; the only direction it was necessary to give the men being to "fire hard." The still held 10 tons, which it took 24 hours to work off. The fire was then drawn down, and the still refilled and set to work again; about two or three hours being required to get it boiling and coming over again. The acid used was obtained from spent oxide; and the quantity of sulphuric acid was 17 cwt. 3 qrs. 20 lbs. per ton of sulphate of ammonia made. Answering questions which were put by different members, Mr. Armitage added that the quantity of tar purchased for distillation last year was about 150 tons, out of 900 tons actually distilled. They did not re-distil the naphtha; but they did the light oil and the creosote. There had been no complaint of nuisance arising from the works. The make of gas per ton of coal was 10,387 cubic feet. The profit on the process of tar distilling was the difference between the sellin price of tar, which was about 27s., and the 48s. 9d. which they

made from the products. As to the production of sulphate of ammonia, Mr. Armitage explained that they had until recently been carbonizing Yorkshire coal chiefly; but at present they were using Wigan coal. The visitors went over other portions of the works, including the anthracene house; and before leaving were photographed near a holder which has just been converted from a single-lift into one of three lifts.

Lancaster Castle was then visited. The old fortress, a portion of which dates from the period of the Roman occupation of Britain, is now, and has long been, chiefly used as a prison. Mr. Armitage had, however, obtained permission from the Home Office for this part to be visited; and with Mr. W. O. Roper, the Deputy Town Clerk of Lancaster, as conductor, the glimpse obtained of the majestic old pile was exceedingly interesting. Mr. Roper is thoroughly conversant with the local antiquities; and he not only told the story of the castle graphically and tersely, but pointed out the many features of that wonderful record of nearly 2000 years to which different portions of the structure bear witness. A climb to the top of the old keep enabled the party to get a charming view over sea and land.

Prosaic business awaited the members of the Institution on their descent from these altitudes. The Mayor (Alderman T. Preston) kindly offered the use of the Council Chamber for the meeting, and, though absent, extended in a very generous manner his hospitality to the members. The business of the meeting included the election of three new members—namely, Mr. Walter Whatmough, Manager of the Heywood Corporation Gas-Works; Mr. J. Swan, Manager of the Ulverston Gas-Works, and Mr. Timothy Duxbury, Manager of the Corporation Gas-Works, Middleton. Then followed a brief discussion on the paper read by Mr. T. Newbigging, on "The Utility of Water in Gas Manufacture," at the meeting on Nov. 30, 1889, and the reading of the paper by Mr. G. E. Saville on "A Combined Washer, Tar Extractor, and Exhaust Regulator," the text of which we give to-day. A report of this part of the day's proceedings will appear in a subsequent number. Several votes of thanks were passed; and the formal business then came to an end.

Waggonettes were by this time waiting to convey the members and their friends to Morecambe, which was reached after an enjoyable drive. Tea at the King's Arms Hotel, and afterwards a brief stroll on the beach, or a few minutes spent in the excellently appointed little works of which Mr. Duff has charge, brought a most pleasant day to an end.

The Proposed Chemical Union.—The following is from the Money Article in *The Times* of Friday last: "For some time past it has been known to the public that an attempt of some kind was being made to establish a Chemical Union for the purpose of taking over the works of nearly all the alkali makers of the United Kingdom. It did not seem to us very probable that this audacious scheme would come to anything; for it was notorious in business circles that the great majority of the works in question were equipped with plant for producing soda by the Le Blanc process, which has been for some years superseded by the Solvay process, in which ammonia is used. Most of the Le Blanc works have, indeed, been carried on at a loss for a year or two past; and those which have contrived to make profits were only able to do so because the ammonia works had not until quite recently been able to produce bleaching powder cheaply. Now, however, this difficulty had been got over; and the single article which could still be produced profitably by the Le Blanc works is being manufactured successfully by their rivals. Under these circumstances, it is natural enough that the proprietors of the Le Blanc works should have tried to establish an association, on the lines of the Salt Union, in the hope that the public might be induced to purchase their works. It is, we think, surprising that any responsible persons outside the trade should have been found to take up this scheme; but there are persistent reports that this is the case, and that preparations are actually being made to launch a company for the purpose, with a capital which rumour puts as high as £9,000,000. The want of caution of the ordinary investor is well known; but we hardly think that even the most careless person will be inclined to put money into the proposed Chemical Union when he knows the facts regarding it which we have already mentioned. It is not only the ammonia process which makes it difficult for the Le Blanc works to continue in successful operation. The progress of scientific discovery is constant; and we believe that quite recently further improvements in the manufacture of soda have been made in the United States, which will render it even more hopeless for the works furnished with the obsolete plant which the public is to be asked to buy to make a profit. Of course, it is urged by the promoters of the scheme that they will, by their combination, be able to raise the prices of soda and other chemicals sufficiently to make their business pay. They might be able to do so for a time—in fact, a considerable rise has already taken place, as our readers are aware. But the Union would not profit by it long, for, first, the rise would lead to many new ammonia works being started; and, secondly—what is even more important—many of their most valuable customers would find it advantageous to start works of their own. We hope that this ill-advised project will be dropped, and that the proprietors of Le Blanc works will make up their minds to the fact that their machinery is old and their process antiquated, and that the best thing they can do is to modernize both."

A COMBINED WASHER, TAR EXTRACTOR, AND EXHAUST REGULATOR.

A Paper read by Mr. G. E. Saville, of Todmorden, at the Meeting of the Manchester District Institution of Gas Engineers last Saturday.

In compliance with the request of the Committee of this Institution, I have pleasure in submitting a short paper on the above subject. To the present audience, it would be presumption on my part to describe the use of a washer; but at the same time I think there are several appliances before the gas profession that are wrongly named—*i.e.*, those called scrubber-washers. I maintain that a washer is an apparatus in which the gas is made to pass through liquor; and that a scrubber is one in which gas passes over wetted surfaces—a distinction with a difference.

To proceed with my paper, the objects of the apparatus I am about to describe to you are to efficiently perform the work of an ordinary gas washer and tar extractor, and at the same time to prevent any undue exhaust or "pull" on the retorts by the exhauster; avoiding the ingress of atmospheric air or furnace gases, with their evil effects, which I am sure you all very well understand. The principle of it is copied from the ordinary gas-pressure gauge; the gas acting on one side of the apparatus, and the atmosphere on the other side.

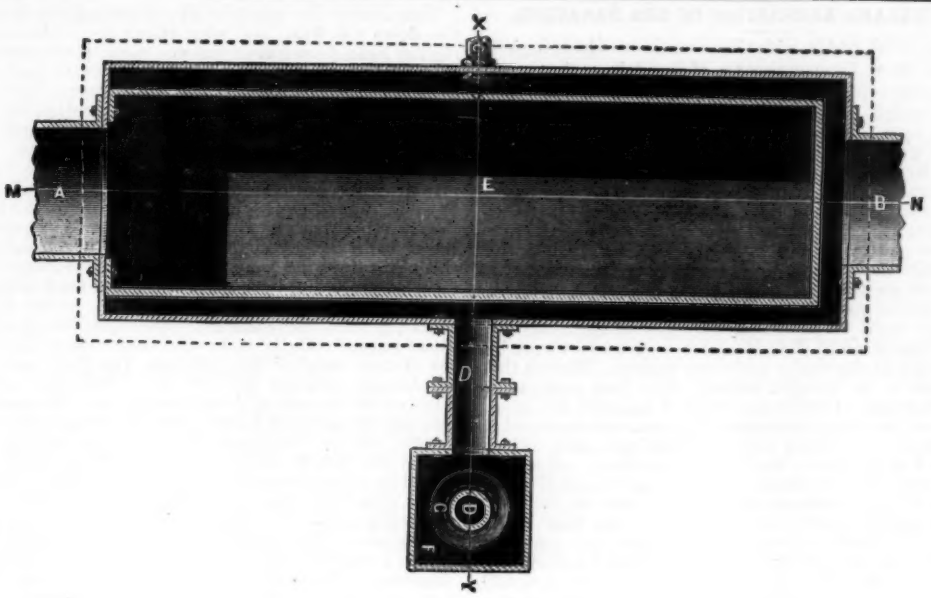
At the gas-works where I am employed, we have an old-fashioned exhauster, and I have had very great difficulty in efficiently governing its speed. I have always felt that all gas-works ought to work without dips in the hydraulic main; but then again I have thought of the very many failures and difficulties that have occurred in this respect. I am disposed to think that the chief cause of the failures has arisen through not having the exhaust under proper control, not through any fault of the anti-dip.

I was led to think of this arrangement of apparatus by noticing at our works on one occasion the variations on the gauge fixed on the inlet-pipe of the exhauster, when a thought suddenly struck me that the very variation as shown on the gauge ought to be the means of adding to, or removing from a seal or dip; that is to say, if the exhauster goes too fast, it ought to increase the seal or dip either on the hydraulic main or on some separate arrangement. The result of this idea has been that I have designed and fixed at the Todmorden Gas-Works an apparatus of the type shown on the drawing now before you, which, so far as I know, is the first attempt to fix a washer before an exhauster. Since I adopted this arrangement, I have been able, without any difficulty whatever, to work without dip on the hydraulic main, even with our old exhauster.

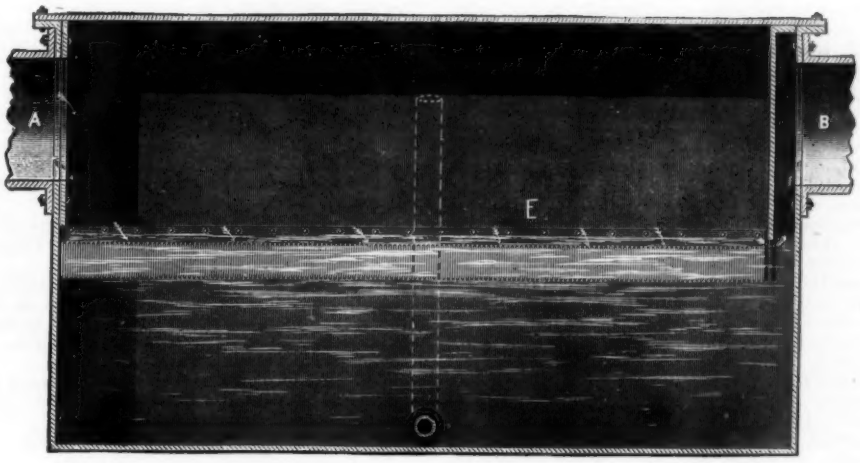
The different parts of the apparatus will be seen from the drawing (full size) now before you of an apparatus calculated to pass 15,000 cubic feet of gas per hour. A is the gas inlet, and B the outlet; C, the inlet for liquor, and D the outlet; E is the washing compartment; F, the overflow compartment; and G, the moveable overflow. In addition to the drawing, I have pleasure in submitting a small model which will perhaps be better to understand than the drawing.

The apparatus should be fixed at a point on the mains between the outlet of the condenser and the inlet of the exhauster. To start it, a constant stream of ammoniacal liquor (not necessarily a large quantity) is supplied through the inlet C; the gas is admitted at the inlet A, the moveable overflow G being adjusted to the level which you desire to correspond with the pressure in the condenser. The gas then passes into the washing compartment E through the two rings of vertical slits shaped much like an ordinary comb. This particular shape breaks up the gas into minute globules, arresting any tarry matters, which readily slide down the teeth of the washing arrangement; immediately falling away from the gas through the pipe connecting the compartments E and F, and passing to the overflow G. No gas can possibly go through this apparatus without being thoroughly scoured with liquor. The method of rapidly passing the tar away as it is removed from the gas does away with the trouble of emptying the washer daily, as is the case with some washers. It will be found by experience that after about the first day the level originally adopted in the compartment F will not be correct, on account of the difference in the specific gravities of tar and ammoniacal liquor. The tar being in compartment F, and the liquor in compartment E, the moveable overflow G has to be lowered to compensate for the difference in the two specific gravities. This difficulty may be avoided by filling the compartment F with tar in the first instance. I think that this may be accepted as proof that the tar is at once separated from and immediately leaves the gas.

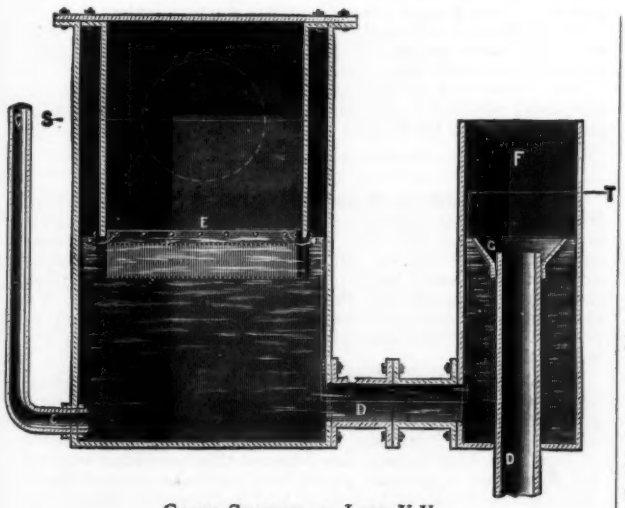
Whatever error there may be in the ordinary working of the exhauster, the level of the liquid inside the washing compartment E will exactly rise or fall with the variations, and will be found to be as accurate as the pressure-gauge itself. The amount of dip or seal of the washer can be set anywhere, from zero to 6 inches, by the draught of the exhauster. The exhaust or pressure on the condenser and the hydraulic main can be exactly fixed by raising or lowering the moveable overflow G; and if by any accident or neglect the exhauster runs below its speed, or entirely stops, the pressure in compartment E becomes greater than that in compartment F, and the seal is entirely removed—thus overcoming the difficulty complained of in other washers, of throwing a great pressure on the retorts when the



PLAN.



LONGITUDINAL SECTION ON LINE M N.



CROSS SECTION ON LINE X Y.

exhauster is standing still, as is often the case in small gas-works during the summer months.

This arrangement of apparatus can be readily adapted where it is desired to work the air process for assisting in purification. By fixing a small valve on the outlet of the washer, and working the exhauster on the pull, any desired quantity of air can be admitted.

The advantages claimed for this apparatus are: (1) That it is an efficient washer; (2) that it is an efficient tar extractor; (3) that it can be fixed before the exhauster; (4) that it is a perfect exhaust regulator, guaranteeing a more regular quality of gas; (5) that the exhauster works with much cleaner gas, consequently causing less wear and tear; (6) work can be safely carried on without dips, thus producing a larger quantity of gas from the coals; (7) it is perfectly self-acting after being once adjusted; and (8) it does not require an expensive foundation, and occupies little space.

The Public Lighting of New York.—The Gas Commissioners of New York a short time ago rejected all the tenders for street lighting made by the electric light companies. In their proposals submitted last April, the companies, as though by prearrangement, united in asking about 25 per cent. more than last year's prices. The increase was explained on the ground that the rent of subways and the expenses incidental to the destruction of their overhead wire system rendered it impossible to do the work at the old rates. But the members of the Gas Commission could not see the matter in this way; and said that the bids were too high, and that the total amounts exceeded the appropriation. The companies were told to submit fresh offers; but when they came in, it was found that none of them had altered their prices. New bids were again asked for; and the following were sent in: United States Electric Lighting Company, 236 lamps, at 35c. per night, up to Jan. 1, 1891, and 43c. per night from that date to April 23, 1891; Brush Company, 169 lamps, at 35c. to Jan. 1, 43c. to April 23, and 69 lamps at 45c.; East River Company, 189 lamps at 35c. to Jan. 1, and 45c. thereafter; Harlem Company, 104 lamps at 35c. and 45c. The Commission have decided to award contracts at the prevailing prices (35c. per lamp per night), but have refused the 10 per cent. advance demanded by the companies. It remains to be seen if they will accept them, as they are only to run till Jan. 1, 1891.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

The following is the paper, with the remarks to which it gave rise, read by Mr. W. B. FEATHERSTONE, of Dundalk, at the recent meeting of the above-named Association :—

NOTES UPON RETORT-FURNACES.

In my notes upon furnaces for heating retorts to carbonize coal, I may as well commence at the first note made, which owes its origin to a weekly paper printed in the interests of gas managers generally. Day after day, night after night, I have, as most other managers have done, stood in the retort-house, and not been happy. The meter indicated that the production of gas was 3000 or 4000 cubic feet per mouthpiece; while the sales of coke only reached 4 or 5 cwt. per ton of coal carbonized. A paper lying on my table published in plain English that 6000 or 7000 cubic feet of gas per mouthpiece, and 11,000 cubic feet per ton of coal could be produced with less labour, material, and wear and tear of plant than the 3000 or 4000 feet were by the method in use at the works under my control. How is this wonderful result to be brought about? The first note reads like an advertisement. Double my make of gas with the same retorts, obtain 20 per cent. more gas, sell 50 per cent. more coke, and pay less wages. Is it not well worth taking a note of? I read: "Make a deep fire to hold a mass of fuel; utilize the waste heat to warm the air supply to the furnace; and give the furnace plenty of air to consume the gases, to heat the retorts." This was not stated exactly in these words; but that is the general meaning. Well, on looking further into the paper in question, there is an account of a small box of bricks producing gas wholesale out of coke and water. This gas, it says, will drive engines, make retorts red hot, and even mix with coal gas, to illuminate the dwellings of our customers.

The next thing was to try something myself; so I took out five old retorts, and put in five ovals, 21 in. by 15 in. by 9 ft. 10 in. in length, and two rounds, 15 in. diameter. The arch was 7 ft. wide, 6 ft. 6 in. high from the floor-line, and 9 ft. to the back wall. My idea was to make gas, and then lead or draw it round the retorts, with a supply of hot air to consume it.

I built a solid brick arch, about 30 inches radius from the front to within 18 inches of the back wall, sunk the ash-pan and fire-bars to give a depth of 18 inches of fuel level with the open door, contracted the depth of the fire from 3 feet to 2 feet back to front at the bars, and left it 14 inches wide. The back of the fire was a hollow box, with holes to allow a supply of air to pass under the fire-bars, meeting the smoke flowing over from the fireplace in front. The gases proceed to travel under the bottom retorts, and then from back to front, &c.; leaving for the main flue at the top of the bench. I tried steam and jets of water; keeping the ordinary ash-pan and open fire-bars. The bottom retorts reached a white heat; but the top ones were not properly heated. I therefore cut a few holes in the arch, and used tar until the back was burnt out. I obtained from 7000 to 8000 cubic feet of gas per mouthpiece from the two bottom ovals; but the top ones spoilt the results. The bottom retorts were soon melted out at the back ends. I think this kind of fire would do well in a large arch; but seven retorts in a space of 7 ft. by 6 ft. 6in. smothered the flame. It would have been better without the middle retort. I then tried six retorts in a bed—three on each side—so as to leave the middle clear. I built three channels (6 in. by ½ in.) directly over the fire, delivering a supply of air in thin streams in three places at an equal distance from back to front. The fireplace I contracted at the bottom; using two bars (18 inches long), 12 inches between the side walls, and sunk the ash-pan so as give 30 inches depth of coke to the level of the door. I used double doors. The walls of the fireplace were nearly vertical, and were soon burnt away when the hot-air supply collapsed. The results were better than by our old method of firing. We sold from 8 to 9 cwt. of coke per ton in place of from 5 to 6 cwt., and the heats were good and steady; but 5000 cubic feet of gas per mouthpiece was a general average.

I also tried a setting of five retorts—three ovals, 21 in. by 15 in. by 9 ft., and two 15-inch rounds. The furnace was made for 3-feet bars 12 inches wide, with a hollow back to deliver air on to the end of the fuel; the air passing under the bars, and up the back, coming into the furnace endways—that is, from the back end. I obtained by this means 6000 cubic feet of gas per mouthpiece, or as much with the five retorts as with an extra oval. The side walls sloped from 12 inches at the bars to about 20 inches at the floor-level. The sides burnt out very quickly; and the coke sold was about 7 cwt. per ton. Then I constructed a furnace 3 ft. 6 in. deep and 14 in. wide, with 3-feet bars, and double furnace doors—the top door coming level with the floor-line, so that hot coke could be pushed in. I made a solid bed of old bricks, and constructed the fireplace to allow room for the flame to spread out, and to get the benefit of the flame higher up, instead of cutting away the side walls, as it did with the straight walls. Another point is the lining. Wedge bricks (9-inch) can be cut out and replaced in a few hours, as the arches are no trouble, lasting several years; but when they were directly supported by the side walls, all collapsed together in a few months. I used 9-inch wedge bricks, which can be knocked out and replaced without interfering to any great extent with the heats, as the bricks have a tendency to keep their own bed, and can be placed in position easily—in fact, they drop into their places.

Now comes the question of comparing the results. I have dug down 3 ft. 6 in.; and what advantage is obtained? Well, a regular heat, 7000 feet of gas per mouthpiece from oval retorts 21 in. by 15 in. by 9 ft., against irregular heats, and an average of from 4000 to 5000 cubic feet per mouthpiece. The small 15-inch rounds produced 5000 cubic feet per mouthpiece, against 3000 cubic feet. The rounding of the side walls and using wedge bricks prevent the cutting action of the flames. Another important point is that the heavy clinker bars do not cut or dig into the walls, but glance off. This furnace fire lasts four hours or more, according to what is required of it. All the coke from the two bottom 15-inch round retorts is required. Another retort is to be put in the top after the furnace is cleaned; the extra top one only once in the 24 hours. The bottom retorts burn only 75 per cent. of the fuel used in the top retorts. This makes the coke used 28 per cent. of the make; but the extra top retort increases the consumption to 33 per cent. This about agrees with the coke sold in the yard—about 8 cwt. per ton of coal, weighed in ½ cwt. lots. The daily sales of coke from the furnace average 32 cwt. The coal used is Wigan Arley. The bed of the retorts loses heat by the others alongside being out, and by being set back against an outer wall. I think better results will be obtained when its companions are lighted; and if the bench were independent of the outer walls, there would be a further improvement. As to the use of tar in the furnaces, the large space and depth is very favourable for this. For this purpose you should get a ¾-inch service-pipe from the tar supply to the burner, which should be made of an inch of ⅜-inch brass tube run in with lead, with a needle as a core, the diameter of the hole required; and with a 10-feet head of pressure, you can get a jet to go anywhere required.

Of course, the deep fire leaves room for another retort in each bed, and can be kept standing with less damage to the retorts. The only alteration I am now making is to construct the side walls hollow, using the 3-feet length of fire-bars, with a width of 12 inches at the bars, and rising pear-shaped to 2 ft. 6 in. across at the floor-line. I find the furnaces have a tendency to burn pear-shaped; so I hope to save the cutting action by letting the flame follow its natural inclination. The air enters in the side walls of the front pit, and can be regulated. It then flows between the furnace lining and the foundation, and through holes in the lining over the fire. Of course, each hole comes between the arches; and there is a straight run up to crown of the arch.

Mr. E. STEARS (Lisburn) wished to know if Mr. Featherstone had reaped any advantage from the use of steam.

Mr. FEATHERSTONE: None.

Mr. STEARS said he himself had been rather puzzled on the subject. At times he thought there was an advantage; and at others that there was not. He wished to know if the retorts could be heated as well without it as with it.

Mr. FEATHERSTONE: Yes.

Mr. STEARS asked if the air chamber stood the heat well.

Mr. FEATHERSTONE replied that it did. In a white, fierce, dazzling heat, it remained all right.

Mr. ROSS inquired the width of the oven.

Mr. FEATHERSTONE: Not quite 7 feet.

Mr. W. T. STORMONTH (Coleraine) thought that Mr. Featherstone had achieved remarkably good results. He considered that 7000 cubic feet of gas per mouthpiece was an excellent output. It was a great advance on Mr. Martin's make.

Mr. J. MEARNS (Banbridge) said that his experience was much the same as that of Mr. Featherstone. He frequently obtained 7000 cubic feet of gas per mouthpiece.

The PRESIDENT, in conclusion, thanked Mr. Featherstone for his paper, which, he said, he had no doubt would prove useful and instructive in the highest degree.

The North British Gas Managers at Perth.—We have received from Mr. J. Smith, of Rosewell (N.B.), a copy of the photograph of the members of the North British Association of Gas Managers, taken at Perth on the occasion of the recent annual meeting. It is small in size—measuring only 8 in. by 6 in.; but the grouping is good, and the features come out clearly. We understand that enlarged copies (11 in. by 15 in.) have been prepared for those who may prefer them. With each size a key is furnished.

Petroleum Engines for Lighthouses.—An interesting application of the Priestman petroleum engine has, says *Engineering*, just been made at the Corsewall lighthouse, Firth of Clyde, where Mr. D. A. Stevenson, the Engineer to the Commissioners of Northern Lighthouses, has adopted this motor for working the fog signal apparatus which has just been erected there. The signal is produced by a siren; and it is to supply compressed air for this that the Priestman engine has been adopted. From the circumstances of the case, steam could not be used, and hot-air engines, so frequently employed in lighthouses, are cumbrous; while if gas-engines are adopted it is necessary to fit up a gas-making apparatus, which again takes up a good deal of room. The engines at Corsewall are three in number, and of 5-horse power each. They use the heavy petroleum employed for lighthouse lamps; hence there is no danger of an explosion occurring, as there would be if benzoline or naphtha were the material.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Mr. Gadd's Gas Institute Paper and Mr. Cripps's Criticism.

SIR,—In reply to "Inquirer," I will say that, in the fig. 3 referred to, the force is represented as being applied on the side of the *plus* sign, in single direction; the leverage being the length of the cantilevers. On the other hand, when these are bound together by a top member, the force becomes resolved into two halves, in opposed directions—one half taking effect in forward motion, as represented by the *plus* sign, and the other in retrograde motion, as represented by the *minus* sign; while the *zero* marks the limit of leverage for each. Now, as the initial force is expended in two opposite directions, and with *half* the leverage, it follows that the resistance becomes *fourfold*. The letter of "C. E." needs no reply whatever.

Manchester, Aug. 27, 1890. W. GADD.

Gasholder Construction.

SIR,—If our friend Mr. Gadd were a little less hypercritical—or, shall I say, somewhat less anxious to discover things he can by any means twist into being in the slightest degree derogatory or disrespectful to either himself or his gasholder?—he would save himself a great deal of unnecessary "agony."

If he will now do me the justice to read again my first letter on the "history question" (see JOURNAL for July 22), he will find that there are no grounds whatever for the grave charges he brings against me in his last letter. When I wrote it, I had not the slightest desire or intention to detract in any way from Mr. Gadd's merits in the matter—in fact, it never crossed my mind to do so; and I feel sure no impartial reader imagined that my letter could be construed in any way derogatory to Mr. Gadd, until, by a species of conjuring, he put it into their heads to do so.

Our friend now claims nothing for which I have not all along given him credit over and over again—viz., *the invention of the first gasholder which entirely, absolutely, and literally, in the strictest sense of the words, abolishes the whole of the external guide-framing, or controlling and guiding power over the gasholder, above the level of the top of the tank.* I do not think I can put it into plainer language. On the other hand, I claimed for Mr. Webber that he was the first to *suggest* the entire abolition of external guide-framing (Mr. Gadd can "minimize" it to an "abstract proposition" if he pleases); and also the first to propose, as a step in the direction of his object, to dispense with all columns, standards, girders, and ties, which are known to engineers as the guide-framing, and to adopt instead stumpy concrete piers only 6 feet high. Mr. Gadd now appears (somewhat ungraciously, it is true) to concede these points; as, no doubt borne down by the weight of evidence contained in my last letter, he feels he cannot longer hold out. We are now, I think, at one on the matter; and the pity is that he should have rushed in so hastily without first making himself acquainted with the *true* history of the case and the recorded opinions of others. I presume Mr. George Livesey is as great an authority on the history of gasholder construction as our friend Mr. Gadd. Mr. Livesey's recorded opinion is: "To Mr. Webber undoubtedly belongs the credit of the really original idea of constructing and working gasholders without external guide-framing." I do not go further than this.

Sutton, Aug. 27, 1890. F. S. CRIPPS.

The Scurfing of Retorts.

SIR,—In the JOURNAL for the 19th ult., I notice a paper, read before the North British Association of Gas Managers, by Mr. J. B. Terrace, on "Retorts Contracted at the Back End," which deals in a somewhat vague and one-sided manner with what once was, but is not now, save in isolated cases, a very difficult and troublesome operation—viz., the scurfing of retorts. As I am not a member of the Association to which Mr. Terrace belongs, and was therefore unable to take part in the discussion as to the merits or otherwise of his suggestion, I shall be indebted to you if, through the medium of your pages, I may be enabled to do so.

Referring to Mr. Terrace's experience under the old *régime*, it would appear that the greatest difficulty lay in removing the carbon from the two corners of the retort (being ⌂ shaped). As every gas manager is well aware, there are thousands of retorts in use which are devoid of any such corners whatever; so that in these cases the difficulty cannot exist. Therefore, instead of their applying universally, Mr. Terrace's remarks apply to a minority only. What he has done is practically to fill these corners with fire-clay instead of carbon; thereby taking from the internal diameter of the end of the retort some two or three inches, causing the deposit to commence where in the case of a clean retort it would take it several weeks to reach, and reducing the available working space accordingly.

There are two things which Mr. Terrace, either wittingly or unwittingly, ignores in his paper—viz., the causes of such deposits, and combustion. Speaking of the irregular depositions of carbon in various settings, the writer simply enumerates them, but proffers no explanation whatever. Had he investigated these matters, he would have known that the more porous the material of which the retort is made, the greater is the facility offered for accumulations, the reason for which is apparent to all; and as the back pressure thrown on to the retorts will vary, when a level gauge is maintained in the hydraulic main, with the least variation in the dip seals, pressure being the chief cause of carbon deposits, the "mysterious" difference may, in many instances, be easily accounted for. With regard to the irregularity of the formation or deposit as a whole, one period compared with another of equal duration, the back pressure given by the apparatus (where no exhauster is used, or where the pressure or vacuum maintained by the exhauster is irregular) may account for a great deal. The greatest wonder of all is that, after proving by experience the tendency to loosen the carbon which was shown by the introduction of a little air at the mouthpiece (for what other reason was it done?), Mr. Terrace did not extend his experiments in this direction before altering the existing shape of the retort end. Had he done so, he must have found, and that very quickly, that by the introduction of air from the front to the back end, the whole mass might be consumed in the easiest manner imaginable, and this while in the old way the lids were dangling loosely on the lugs. This may be, and continually is being achieved by carrying the air through pipes laid along the bottom of the retort from (say) a foot outside the mouthpiece, so as to be able to keep the air supply acting directly on the carbon at the end, and pushing in the pipes as the carbon is consumed, using the ascension-pipe as a chimney, by removing the plug or flange at the top and bricking up the mouthpiece. In this manner, a retort with an accumulation of 6 or 7 inches of carbon at the back may be entirely freed within 20 hours from the time of inserting the air-pipes, without the application of a bar of any kind, while the other retorts in the same setting may continue to work in the usual manner. What is required in the first instance to check the deposit of carbon, is not to reduce the carbonizing capacity of the retort, by contracting the back end (for in many instances this is scanty enough already), but to present to the gas as fine and glazed a surface as possible, thereby reducing the friction to a minimum. This may be done by almost any of the fire cements now in the market.

In the case of removing such deposits, the means employed should not be to shorten the life of the retort by making it a target for the butts of a battering-ram, but such as will attain the desired end in the most natural and economical manner possible. This may be done by treating the carbon in the same manner as we should were it transferred from the retort to the furnace. If Mr. Terrace has not experimented in this way, it might be to his benefit to do so; and supposing he has, and finds his contracted retorts superior to glazed surfaces and combustion, I, for one, should be pleased to sit at his feet.

Aug. 26, 1890. EXPERIMENTUM CRUCIS.

Sewerage Scheme for Marseilles.—The Mayor of Marseilles has signed a contract for a sewerage scheme which is to cost 33,500,000 frs., and is to be executed in five years.

The Hastings Electric Lighting Scheme.—The ratepayers of Hastings held a meeting last Tuesday, at which the electric light scheme—or "job," as it was called by one speaker—of the Corporation was discussed. The general opinion was that the project could not be carried out for the amount estimated by the Borough Surveyor (£5550, with 5 per cent. for contingencies); and it was decided to ask the Mayor to call a town's meeting on the subject.

Lamp Manufacturing Company, Limited.—This Company was registered last Tuesday, with a capital of £16,000, divided into 1000 preference shares of £10 each, and 3000 ordinary and 3000 deferred shares of £1 each, to adopt an agreement with the Ridsdale Railway Lamp and Lighting Company, Limited, and its Liquidator, Mr. Edward Cecil Moore; to manufacture lamps of all kinds, and apparatus for the consumption and supply of gas, oil, and electricity; to carry on business as mechanical, gas, and electrical engineers; and to produce and supply gas, oil, electricity, or electrical currents or force, for light, heat, or motive power.

The Dunedin (N.Z.) Corporation Gas Undertaking.—According to a report presented at a recent meeting of the Dunedin City Council, the working of the gas undertaking in the year ending March 31 last resulted in a loss of £643, as against a profit of £1433 in the previous year. Comparing the items of expenditure during the past with those of the previous year, the additional cost of coals, purifying, and wages amounted to £2582; but against this the income from gas residual products increased by £2776. The production of gas for the exhibition no doubt accounts for these items; and the extra income derived from the sales just about balances the cost of production. The expenditure, as compared with the previous year, for maintenance amounted to £1132; for service of the exhibition and exhibits there, £279; and for costs in the case of *Schmidt v. The Corporation* £521; showing in these three items an unusual expenditure of £1932. Had this not been experienced, and had the expenditure been normal, the operations of the gas-works during the past year would have resulted in a very similar profit to that earned during the previous twelve months. It was thought it might be reasonably hoped that, although the gas account shows an actual loss this year after making allowance for depreciation (£2250) during the now current year, it will return to its ordinary position and yield a fair profit after payment of all charges.

John Burns on the South Metropolitan Strike.—Speaking last Thursday evening at a crowded meeting of the National Union of Gas Workers and General Labourers of Great Britain and Ireland, held at the Great Assembly Hall, Mile End Road, under the presidency of Mr. W. Thorne, the General Secretary, at which a new banner of the Stepney branch was unfurled, Mr. Burns said they might be assured that if the Liveseys and the Norwoods could get at their weak side—if they could rely upon sufficient blacklegs to weaken the power of the unionists to fight them—they might resign themselves to losing the eight-hour day and all the other advantages they had wrested from capitalists. Hence he advised the gas workers and all other labourers—skilled and unskilled—to strengthen their unions to the utmost. The Gas Workers' Union now numbered 100,000 members, and it had secured the eight-hour maximum working day for the employees in nearly all the gas-works of the United Kingdom. Mr. Livesey was very jubilant just now. (Hisses.) They should not hiss him. What they had to do was to pay up their twopences and sixpences to fight him. His statements to the shareholders of the South Metropolitan Gas Company were not true. He told them that the strike in connection with that Company was because the Directors would not countenance an intolerable demand from the men; whereas it was because the men objected to an intolerable bogus profit-sharing scheme being forced upon them that they were compelled to strike. Then Mr. Livesey said the new hands did their work remarkably well. If so, how came it about that during the past six months 64,174,000 cubic feet less gas were made, with the consumption of 1700 tons more coal, than in the corresponding six months of last year before the strike? He (Mr. Burns) advocated the municipalization of gas-works.

MISCELLANEOUS NEWS.

BARNET DISTRICT GAS AND WATER COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Friday, at the Guildhall Tavern, Gresham Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY (Mr. Alfred Lass, F.C.A.) having read the notice convening the meeting, it was agreed to take as read the Directors' report and the statement of accounts, some particulars from which appeared in the JOURNAL for the 19th ult. (p. 412).

The CHAIRMAN, in moving the adoption of the report, said that the past six months had been a period of anxiety to all gas companies; the totally unexpected rise in the price of coal having especially caused them great concern. In their own case, the last reduction made in the charge for gas was influenced by the full confidence they had that at the present time they would have been paying for coal 1s. 1d. less per ton; but, instead, they were paying a multiple of 1s. 1d. in excess. It seemed strange that, in an ordinary matter of business, so sudden a rise could take place. It had been suggested that there was a "ring" of gas coal proprietors. He hoped it was not so; because it would not be dealing with their best customers aright. Having heard that the Directors had had to buy coal at an enhanced price, the shareholders would be prepared to find that the manufacturing charges in the gas revenue account had been augmented; and that the total sum expended in the past six months was £500 more than in the corresponding half of last year, when the amount was £2600. The other items on the debit side of the account were so similar to those of last year, that there was no need to make any remarks upon them. It would be observed, on the opposite side of the account, that 4 per cent. more gas had been sold, which produced an additional £200. Coke showed an improvement of £165; and breeze and tar was better by £100. The residuals together had yielded £247 more than in the June half of 1889. Therefore the extra revenue from all sources about balanced the excess of expenditure. The amount remaining to be carried to profit and loss account was £2389; being £5 more than it was this time last year. When one had been looking forward to the time when it was thought there would be a better return on the capital, and then found that the profit was only £2389, while ten years ago it was £2472 (being £83 more), it was really disheartening. It always seemed to happen that just at the time when it was believed that there would be a turn, something came to check it. Since 1880, there had been eight reductions in the price of gas; so that all the result of their labour during those ten years had been given to the consumers, who were now charged for gas 4s. per 1000 cubic feet. Turning to the water portion of their undertaking, he said that, during the past eight or nine years, the Directors had devoted their attention to placing it on a sure and safe foundation. This they had accomplished. The plant was now in the best possible condition; they had an abundance of water; and they were now reaping the full benefit of the capital they had spent. Comparing the items of expenditure with the corresponding half year, they were almost identical, except in one item—that of rates and taxes in the water accounts. In the past six months, under that head £569 had to be paid away, as against £351; being an increase of £218. He was the last man who would not wish to pay his fair share of rates and taxes; but he did like equity, and it seemed to him that this item was now a little too much. On the other side of the account, the shareholders would find that the water business had grown; the profits being something like £700 more than in the first six months of 1889. Therefore taking the profits on the gas-works, £2389, and those on the water-works, £4829, and a small amount derived from fittings, they had a total profit of £7303; being the best result they had ever experienced. This sum would be reduced by the interest on the debenture bonds; but it still left enough to meet the increased dividend paid in the previous half year, and to carry forward between £300 and £400 to the next accounts. The present balance-sheet was the most gratifying one they had ever had; and he believed it was typical of all that would follow, and probably they would be better still.

Mr. C. HORSLEY, J.P., seconded the motion.

Mr. WAKEFIELD, having congratulated the Directors upon the improvement shown in the accounts, said he understood that the last valuation of the gas and water pipes was higher than formerly; and he believed it was going to be opposed. His impression was that it would have been better to have made a lower valuation; but he appealed to the Directors to avoid litigation if they could possibly do so. At the same time he thought it right to object to the valuation, and endeavour by friendly means to get it reduced.

Mr. PLUMMER said he noticed that 4½ per cent. was still being paid on the sum of £13,850 of debentures. This, he considered, was very high, and he inquired how long they had to run. He knew of 4 per cent. debentures which stood at a considerable premium.

The CHAIRMAN replied that debentures were generally granted for five or seven years; and he could not at the moment say how long they had to run. Some were falling in nearly every year. They tried to get this £13,850 at 4 per cent., but failed. It would be observed that they issued the other debentures (amounting to £19,750) at 4 per cent.

Mr. J. RANDALL, in congratulating the Directors on the prosperity shown by the accounts, referred to the small amount of bad debts, which he said in the gas department were only 6s. 3d. per cent., while in the water department they were 13s. 6d. Referring to the remarks made by the last speaker, he said that, considering the adverse state of the money market during the past six months, especially in the earlier part of the year, the Directors had done well to secure themselves by getting debenture bonds at terminable periods. He proceeded to suggest that, if their Act permitted, the bonds should be converted into debenture stock; and then they could issue it at 4 per cent.

Mr. GEORGE ANDERSON said he found, on examining the accounts, that they had had a good production of gas per ton of coal carbonized, and that the percentage of unaccounted-for gas was very low—lower than, he was sorry to say, he could find in the case of any of his own works. This indicated that the plant was well looked after. He believed he asked at a previous meeting whether the Directors had ever considered the question of selling gas at a lower price for cooking and heating than they did for lighting purposes. Of course, circumstances differed; but in his own experience, he had found it to his advantage at several places to supply gas for cooking and heating at a cheaper rate. The Directors all well understood the business of the Company; and he merely threw this out as a suggestion. It behoved everyone connected with the Company, however, to try in every way possible to extend the use of gas. He might remark, while on this subject, that Mrs. or Miss Sugg (he was not sure which) had published a nice little book on cooking by gas. He had read it; and he thought it should be put into the hands of everyone who was contemplating employing gas for cooking purposes, as it showed how to use it well. He knew, from almost 40 years' experience, that cooking by gas was much better than cooking by coal.

Mr. DYER, while agreeing with nearly all that had been said by the last speaker, took exception to a different price being charged for gas for heating purposes. That would, he thought, entail an amount of work which would be hardly desirable; but at the same time, he thought that the policy the Directors had been pursuing in generally reducing the price of gas was a very wise one indeed. He was connected with a gas company; and his opinion was, speaking from experience, that the gas sold for cooking and heating would ultimately be the backbone of the business of gas companies. So largely was cooking by gas spreading, that the South Metropolitan Gas Company, he believed, now received between £5000 and £6000 from this source alone. With reference to the debenture stock, he suggested that, when the mortgage bonds became due, they should be turned into perpetual debenture stock, and offered to the shareholders at 4 per cent.

Mr. W. E. THOMPSON asked whether it would be possible to get a quotation on the Stock Exchange.

The CHAIRMAN said that the Directors applied some years since for a quotation; but it was refused, on the ground that they had then so many different stocks on the list. With respect to rating, he thought their valuation was too high; and the Directors would do what they could to get it reduced. In regard to the debenture bonds, they tried to get the money at 4 per cent., but did not succeed. They were, however, getting stronger day by day, and might be enabled to again obtain the money at 4 per cent. As to the use of gas for cooking and heating, he reminded the shareholders that the Company had recently held an exhibition of gas appliances, which had resulted in the letting out of 50 stoves; bringing the number in use in the district to considerably more than 100.

The motion was then unanimously carried.

The CHAIRMAN next proposed, and Mr. C. HORSLEY seconded, the declaration of a dividend at the rate of 7½ per cent. per annum on the "A" and "C" stocks, 6½ per cent. on the "B" stock, and 5½ per cent. on the "D," or water shares, all less income-tax.

The proposition was agreed to.

A vote of thanks was passed to the various officers of the Company, on the motion of the CHAIRMAN, who spoke in very laudatory terms of the manner in which each performed his duties.

The SECRETARY (Mr. Lass) and the ENGINEER (Mr. T. H. Martin) both acknowledged the vote on behalf of themselves and the staffs; the former observing, with regard to himself, that he had improved in health, and he hoped this would enable him to work more vigorously for the Company.

Votes of thanks having also been accorded to the Auditors (Mr. F. Lennard and Mr. A. G. Hounsham) and to the Chairman and Directors, the proceedings terminated.

CONTINENTAL UNION GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held last Wednesday, at the London Offices, 7, Drapers' Gardens, Throgmorton Street, E.C.—Mr. H. MCLAUCHLAN BACKLER in the chair—to confirm the resolution altering the Articles of Association passed at the meeting on the 12th ult. (*ante*, p. 409).

The SECRETARY (Mr. F. W. Himing) having read the notice convening the meeting,

The CHAIRMAN said that the meeting was merely a formal one to confirm the resolution passed when the shareholders last met together. On that occasion the subject was sufficiently discussed; and therefore he would make but very few remarks. The object of the alterations in the Articles of Association was, as the proprietors were aware, to convert the shares into stock, and to cancel the unpaid capital, so that it might be converted into stock, which operation could not otherwise be effected. Then they would only have two classes of stock—the preferential and the ordinary—and this, he believed, would satisfy everyone. Unfortunately, there was a deal of trouble involved in carrying out anything of this kind, owing to the imperfect state of the joint-stock law, and that which appeared to be simple in itself really occasioned a great deal of unnecessary trouble. For example, they were meeting that day for the second time to enable the Company to do that which was required in altering their Articles of Association. But that was not all. Assuming the resolution to be passed, it would be essential to hold more meetings, in order that the shareholders might give the Directors the power requisite for carrying out the objects he had named. It was proposed to hold the first of these meetings on the 9th of September; and the confirmatory meeting on the 24th of the month—an interval of fourteen days, counting Sundays. This being done, they would then have to go to the Court to obtain the necessary sanction to the reduction of capital. The reduction was a very small amount—only £72,000—but still it could not be carried out excepting by the permission of the Court, which, he believed, would be granted without much difficulty, because the Company had no debts whatever. As the shareholders knew, all the debenture debt had been paid off; and the trade debts ran from week to week. They paid for the coals supplied, and every article received, within a week, or, at the outside, a month of the day when the debt was incurred. This could be shown to the satisfaction of the authorities. Another meeting would then be held to convert the shares into stock; and the Board were in hopes that, by the general meeting of the shareholders about the middle of October, the whole

scheme would be carried through. If this was so, the next dividend would be on the stock, instead of the shares. He concluded by moving the confirmation of the resolution.

Mr. BUXTON MORRISH said that, as a holder of both classes of shares in the Company, he had great pleasure in seconding the motion. He had had the opportunity of consulting a leading firm of brokers in regard to this matter, and they confirmed all the Chairman had said as to the necessity of its being carried through. This, he added, was only another proof of the admirable management of the Company by the Chairman and his colleagues.

The CHAIRMAN observed that he was pleased to hear these remarks, especially after what occurred at the last meeting.

The motion was unanimously agreed to; and the proceedings terminated.

BRISTOL UNITED GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday—Mr. J. W. S. DIX in the chair.

The SECRETARY (Mr. J. V. Green) having read the notice convening the meeting, the report of the Directors, an abstract of which was given in the JOURNAL last week, was taken as read.

The CHAIRMAN remarked that the Company had had difficulties to go through during the past half year; but, notwithstanding this, he thought the report presented must be regarded as satisfactory. A considerable amount—rather more than £10,000—of the additional expenditure shown by the accounts was for coal; the strikes having compelled the Directors to buy in other markets, when their contractors could not carry out their contracts. This had caused an outlay of £5000; and a smaller amount had been paid extra for coal owing to the rise in price. The Directors had made considerable advances in the wages of their men. They had had their trials so far as strikes were concerned; and the resulting increase of wages was something more than £2000. The Board had determined not to keep to their standard of 13·50-candle gas, but to give a thoroughly good article of extra illuminating power; and this meant a considerable difference in the accounts. They had raised the price 2d. per 1000 cubic feet; but the public wanted a better article, and were willing to pay for it. The Directors thought it would be a good stroke of business if they could devise some plan to get the gas into smaller houses; and it had occurred to them that if they could, by arrangement with the landlords or with the tenants, put in fittings and let them for a small charge, it would be of benefit to the Company. With regard to their works, on buildings and plant upwards of £6000 had been spent, of which £4000 was in respect of the Barton Hill gasholder, which had been tripled. They had now storeage for 7¼ million cubic feet of gas—quite sufficient for all present needs, though he should not be sorry if it were not sufficient for their immediate future, for he hoped the demand for gas would extend. They had spent more than £2300 on new mains; and they had a sum of £936 12s. 2d. for stoves, which was a cheerful item, because when they were threatened with electricity and other illuminants, if they could foster the stove business there need be no fear of opposition—gas would be the heating power of the city. On the whole, he thought he might congratulate the proprietors on the work that had been done in the past six months, and on the accounts he had the honour to present to them. He concluded by moving the adoption of the first four paragraphs of the report.

The DEPUTY-CHAIRMAN (Mr. G. K. Stothert) seconded the motion.

Mr. R. GILES thought it was unusual to divide the report.

The CHAIRMAN: It is not at all unusual; but I will take the whole report if it is desired.

Mr. GILES then proceeded to criticize the accounts; pointing out that in the half year ended December, 1889, the coal carbonized cost 9s. 6d. per ton, while last half year it cost 10s. 11d. The increase was, he said, apparently due to waiting to renew the contract. He regarded the advance in the price of gas as a calamity; and said it was followed almost at once by an effort on the part of the Corporation to introduce the electric light. The Company's prospects were very gloomy. The Gas Workers' Union was now completely master of the Company. This was a most alarming prospect, and was a matter which would ultimately have to be fought, as it had been fought by Mr. Livesey and his colleagues. The men at Bristol had been decidedly truckled to, and not to their own advantage, because he believed that they would be far safer in the hands of a Board, if it were wise, than in the hands of any Union. An able officer had been dismissed from Avon Street—or rather had been called upon to resign—solely for carrying out the instructions of the Directors.

The CHAIRMAN denied that the officer in question had either been dismissed or called upon to resign.

Mr. GILES said he had it in the person's own handwriting. Passing on to refer to the charges he (Mr. Giles) had brought against the Directors, and sent by him in writing to them—charges which, he said, had been in their hands for three months—he asked what steps had been taken in regard thereto. It was promised that they should be investigated.

The CHAIRMAN: I am going to move a resolution, and bring the whole matter forward so far as what you call your charges—but which I call allegations—are concerned.

Mr. GILES: Then I am answered. That is quite satisfactory.

A SHAREHOLDER called attention to the fact that, though the Company had manufactured a million cubic feet more gas, there had been a million feet less paid for. There must, he said, have been considerable leakages somewhere.

The CHAIRMAN said they had supplied gas of a higher illuminating power. Their leakage was not in excess of other companies.

The portion of the report dealt with in the motion was then adopted; and a dividend at the rate of 10 per cent. per annum was declared.

The CHAIRMAN expressed the regret of the Board at Mr. J. L. Stothert's retirement on account of ill-health; and observed that the minimum number of Directors allowed by the Act was six (the maximum being twelve), and they thought that seven would be ample to carry on the business of the Company. He therefore moved that the number be reduced to seven as a maximum.

This was agreed to.

The Auditors' fees were next raised from £100 to £150 annually.

The CHAIRMAN next moved that the Directors' fees be increased to £1250 per half year. In doing so he remarked that the Company was one of the largest, if not the largest gas company out of London; and the duties of the Directors involved the sacrifice of a great amount of time. If the proprietors wanted to get good business men to manage their affairs, they must make it worth their while. He had no fear for the future; but if they wanted prosperity they must have the undertaking well looked after, and thoroughly worked. The remuneration of the Directors did not affect the dividend; but they required a good Board to keep up their dividend. A great deal had been said about a gentleman who had resigned his post under the Company; but he (the Chairman) was glad to say that now there was a good feeling between the employees and the Board. As he went about the works he heard no complaints; and the men were cheerful and contented.

Mr. ROBJENT seconded the motion.

Mr. GILES thought the request of the Directors was most extravagant. He said if anybody ought to know the duties and labours of a director, he certainly should. He spent 250 days solely in the service of the Company, and he was perfectly satisfied with the fees. This £2500 a year worked out to £350 for each Director, which was £14 for each attendance at a Board meeting. This was a really extravagant sum, and the request was made with a certain amount of indecent haste. He was the one to move that the Directors' fees should be increased from £800 to £1000; but then there were nine of them. He protested against the Directors being made salaried servants; and if he were on the Board, he would retire rather than accept the £350. It was said that they paid 10 per cent., and could legally pay no more. If they had taken his advice they would have paid more long ago. He went for the sliding scale, which had been adopted by other gas companies, and had been described by the Board of Trade as a very successful mode of conducting their business.

Mr. MEDWAY protested against the proxies being used for the purposes of this resolution, and said if he had his way the people who sent proxies should have their dividends reduced. He thought the Directors might take £300 each.

A SHAREHOLDER suggested that the terms of the resolution should have been sent out, so that those who voted by proxy might know exactly what they were voting for.

A vote was taken; and the Chairman declared the motion carried. This was denied by Mr. Giles, who asked for a poll of the room.

Mr. MEDWAY said he was willing to propose, as an amendment, that the amount should be £2100, which would give the Directors £300 each.

This amendment was lost by 17 votes to 16. The original motion was then put, and the number in support of it declared to be 22. Mr. Giles challenged this; and a poll of the room was suggested.

Mr. MEDWAY: I think we are bound to meet the Directors in some way. If you will not give them £300 each, what will you say to £250?

Mr. FENWICK RICHARDS (after conferring with the Chairman) said he had the Chairman's sanction to say that the Directors would accept £2100; and he proposed that this be their remuneration.

Mr. GILES protested that this could not be proposed, as it had already been rejected.

After some further discussion, the amount was fixed at £2000.

The CHAIRMAN then said a resolution was passed at the last meeting that if Mr. Giles would put his charges into writing, the Board would consider them. Mr. Giles had sent in certain allegations extending over 66 pages of closely-written matter. There was nothing reflecting on the present Board; but it was suggested that if they made inquiries into the matter—going back sometimes to 20 years ago—they would find that certain persons had received a commission, and they might discover other peccadilloes. But there was not in Mr. Giles's allegations the least evidence that would do to go before a jury or a judge. The Board had well considered the entire matter; and had also been advised by their Solicitor, who had taken Counsel's opinion. The Board had likewise consulted two eminent Counsel on that circuit; and they all agreed in distinctly advising the Board that there was nothing in Mr. Giles's document which, upon investigation, would tend to benefit the Company in any way. There was no case which, as a lawyer, he should recommend any client to pursue; and therefore he moved—"That Mr. Giles having, in accordance with the resolution passed at the last half-yearly meeting of proprietors, forwarded to the Board certain allegations in writing, the Board have considered the same, and are advised by their Solicitor and by Counsel that no advantage would accrue to the Company from any action that could be taken; this meeting is of opinion that the Board have fulfilled their obligation to the proprietors, and considers it unadvisable to further proceed with the subject."

Mr. MEDWAY seconded the motion.

Mr. ROBJENT moved, as an amendment, that a Committee consisting of shareholders should be appointed to read through the charges and report whether they were serious or merely "crotchety."

Mr. MEDWAY said he was utterly sick of the whole question, and thought it was best to let it drop.

Mr. ROBJENT said if this was the unanimous feeling of the shareholders present, he would withdraw his amendment.

Mr. GILES said half the number of pages in the document he had submitted were occupied in disproving charges made by the Directors against himself. He accused some members of the present Board—Dr. Highett and Mr. Jones, especially the latter—of being a party to the transactions in question. He then proceeded to repeat certain allegations against officials and Directors, and said he did not say there was a legal case against the present Board, but they were bound in honour, having passed a resolution, to give effect to it. The charges made against himself were not only untrue, but maliciously untrue.

Dr. HIGHETT: Mr. Giles has mentioned my name, and I may as well perhaps inform you that there was a contract issued for the carrying of coal when we were paying about 1s. 10d. a ton for carrying it. This contract was offered to us at 1s. 6d. It so happened that some other people thought they might get it, and they sent in a note to say they would carry the coal at 1s. 4d. We had information that this contract would save us, at 1s. 6d. a ton, about £1000 a year; and therefore we accepted it, and I accepted the £1000 a year saving, which I certainly considered to be for the benefit of the Company.

Mr. BOBBETT said the result of the conferences of the Provisional Committee with the Board had led to one gentleman resigning. As no charge was made against any member of the present Board, he utterly failed to see the use of going into charges extending over 20 years, and against persons, some of whom had even ceased to be shareholders.

The amendment was then withdrawn, and the resolution carried with only two dissentients.

A vote of thanks to the Chairman concluded the meeting.

PARTICK, HILLHEAD, AND MARYHILL GAS COMPANY.

The Twentieth Ordinary General Meeting of this Company was held in Glasgow last Friday—Mr. H. COWAN in the chair.

In their annual report (which was taken as read), the Directors stated that the results of the business for the year ending June 30 last would, they believed, be gratifying to the shareholders, in view of the large increase in wages and in the prices of coal and other materials. The net profit for the year, after payment of all interest on debentures and debenture stock, and providing for interest on the depreciation (£606 2s. 4d.) and reserve (£8 7s. 8d.) funds, and including the balance brought forward from last year, amounted to £10,831 4s. 3d., out of which the Directors had carried to the depreciation fund £1500; leaving a balance of £9331 4s. 3d. This the Directors recommended should be applied (1) in payment of a dividend of 5½ per cent., less income-tax, on the preference shares, amounting to £1650; (2) one of 6 per cent. on the ordinary shares, amounting to £6000; and (3) in reduction of the parliamentary expenses incurred during the past session, £1000—total, £8650; carrying forward £681 4s. 3d. The report proceeded to say that the works had been kept, as usual, in a thoroughly efficient condition; all repairs, maintenance, and renewals (which had been unusually heavy) having been charged against revenue. During the year 536 meters and 252 gas-stoves had been fitted up, and 6295 yards of mains laid. As the shareholders were aware, the Corporation of Glasgow promoted last session a Bill for the extension of their boundaries so as to include a large portion of the Company's district of supply; and in the Company's interests it was considered necessary for the Directors to deposit a Bill containing the provisions required for their protection. Both Bills being unsuccessful, matters were left practically where they were before. The accounts connected with the parliamentary proceedings had not been made up and adjusted; but the Directors had thought it right to carry forward £1000 to the credit of them. In the course of the proceedings, the Directors were strongly advised to acquire the works and goodwill of the Dalmuir, Old Kilpatrick, and Bowling Gas Company, Limited; thus permitting the extension of the Company's business westward through the populous districts along the north bank of the Clyde, as well as removing a strong opposition by them to the Bill being promoted by the Company. The Directors accordingly acquired the business, at the price of £11,000, of which £1000 was applicable to the land, and the balance to the machinery, pipes, and other assets purchased. In the statement of accounts accompanying the report, it was shown that the share capital consists of £100,000 in the shape of ordinary shares, and £30,000 as preference shares bearing interest at 5½ per cent. —in all, £130,000, and all paid up. The capital raised by debenture loan amounts to £29,490, and by debenture stock to £29,000, of which there is still £51,000 remaining to be borrowed. The revenue account showed that there had been expended under the head of manufacture of gas a sum of £24,350 10s. 2d.; £14,533 5s. being for coal, dues, carriage, loading, &c. For the distribution of gas the outlay was £2004 5s. 3d.; for the gas-stove department, £205 11s. 2d.; rates and taxes, £1126 17s. 2d.; management, £1426 1s. 9d.; parliamentary and law expenses (1886-7), £156 19s. 3d.; discounts, bad debts, &c., £243 18s. 3d.—making a total expenditure of £29,514 17s. 3d. The income for sales of gas by meter amounted to £28,839 4s., and for public lighting and under contract to £4175 12s.—together, £33,014 16s. For coke sold there was an income of £3386 5s. 7d.; for tar and ammoniacal liquor it amounted to £5399 17s. 8d.; and for waste lime the net income was £9 8s. 6d.—together, £8776 14s. 9d. Rents yielded £95 15s. 2d.; and the gas-stove rents amounted to £229 13s. 8d. The total revenue thus came to £42,116 19s. 7d.; so that there was a balance of £12,602 2s. 7d. to be carried to the profit and loss account, and the net amount available for dividend, &c., was £9331 4s. 3d.

The CHAIRMAN said the gross revenue for the year had substantially increased, but out of this they had to meet a considerable rise in wages, and also the additional cost of coal and other materials; the advance in the wages having been caused by the alteration in the hours of labour from twelve to eight. The quantity of gas made had been upwards of 300 million cubic feet; being an increase of more than 24 millions, or about 8½ per cent. As far as they had gone, the present year showed an improvement as compared with the last. Coals had been contracted for on favourable terms; and for the residual products a considerable advance had been obtained over last year's prices. The works were never in better order; and an additional line of rail had been put down, whereby a saving would be effected in the handling and disposal of coke. The report referred to the parliamentary proceedings that took place during the past session. The action of the Corporation of Glasgow in promoting a Bill for the extension of the city boundaries forced the Directors to take action to defend the Company's interest, with the result that matters were practically left where they were by the rejection of both the Corporation's and the Company's Bill. It was obviously quite incompatible with the Company's interest that the Corporation, who competed in the gas supply, should become the Local Authority over any portion of the Company's district; and in the course of the parliamentary proceedings the Directors received strong indications from the Committee that the Company would receive adequate protection in case of any annexation taking place. It had practically been admitted on all sides that the only satisfactory mode of settlement of the matter was for the Corporation to purchase the Company's undertaking; and the sole question had been as to the way of ascertaining the figure. The Directors thought the strength of the Company's position was such that they might have fairly demanded a high price, and refused to sell at less than their own terms. But they felt that such a course might have appeared obstructive; and at an early stage of the proceedings they intimated their readiness to leave the fixing of the price to arbitration. This was the method in which a large number of gas-works had been transferred to local authorities, and it would relieve both the Directors and the Town Council of considerable responsibility. The Directors regretted that the Corporation had not up to that time agreed to that course; but they trusted that some mutual and satisfactory arrangement might yet be arrived at. The only other matter to which he had to refer was the purchase of the works of the Dalmuir Company. There had been of late years a great increase in the population westwards along the bank of the river; and the Company's mains had been approaching the western termination of those of the Dalmuir Company. In order to avoid conflict with that undertaking, and overcome a serious obstacle to the Company obtaining parliamentary power in that district in the future, the Directors, on the advice of the Gas Engineers whom they consulted, agreed to acquire the works of the Company on the terms stated in the report. Although at first the revenue from this portion of the business might not be large, the Directors had every reason to anticipate that the purchase would assist materially the development of the business. In order to comply with a clause in the Articles of Association, requiring any purchase of land to be confirmed by the shareholders, the motion which he had to submit had special reference to this matter. He concluded by moving the adoption of the report, the declaration of the dividend, and the approval of the purchase of the Dalmuir works.

Mr. KING seconded the motion.

The CHAIRMAN and the SECRETARY (Mr. J. Graham) having replied to a few questions, the motion was carried unanimously.

In accordance with the recommendation contained in the report, Messrs. Cowan and Taylor were re-elected Directors; and to fill another vacancy on the Board, Mr. R. Young was chosen. Mr. J. Wilson, C.A., was re-elected Auditor.

The meeting terminated with a vote of thanks to the Chairman.

The Lock-Out at the Enfield Gas-Works.—We understand that the Manager of the Enfield Gas-Works (Mr. A. W. Archer) is not experiencing any difficulty in consequence of the change of workmen resulting from the reversion to the twelve-hour system at his works, as mentioned in the JOURNAL last Tuesday. He has plenty of men, who are lodged and boarded on the premises, and receive 6d. a day extra for the additional time they are employed. All is going on satisfactorily.

Gas Explosion at Accrington.—Last Thursday a serious gas explosion occurred at Accrington. Smelling gas in the house, a working man named Farrington and his wife entered the parlour with a lighted candle for the purpose of turning off the supply at the meter. Immediately the light was taken into the room there was an explosion, which was of such a violent character that the house was partially wrecked. Farrington, who was carrying the candle, was badly burnt about the head, face, and arms; but his wife escaped with a slight burn on the arm.

Gas and Electric Lighting Affairs at Huddersfield.—At the last monthly meeting of the Huddersfield Town Council, the minutes of the Gas Committee (which were approved) stated that the balance-sheet of the gas undertaking for the half year ending June 30 showed a profit of £3949, to be carried to the credit of the borough fund. It was also reported that the Sub-Committee had considered the advisability of taking steps for establishing an electric lighting station, under the Provisional Order which the Corporation had obtained, and had appointed the Mayor, Chairman, and Vice-Chairman of the Sub-Committee, and Mr. Calvert to inspect the electric light systems in operation in other towns and to report thereon.

The Birmingham Corporation Gas Committee and Prepayment Meters.—The Chairman of the Birmingham Corporation Gas Committee (Alderman Pollack), in his speech on the annual report of the department in March last, referred to the probability of the Committee undertaking to supply gas to some new artizans' dwellings, by means of meters with a prepayment attachment. The Committee have now not only laid gas into the cottages, but are ready to provide a gas fixture in the living rooms. The prepayment meter to be adopted is one furnished by Messrs. Sawyer and Purves, of Manchester. A penny placed in the slot will pass 25 cubic feet of gas; being at the rate of 3s. 4d. per 1000 feet; this charge, however, constituting not only a payment for the gas, but a rent for the fittings. If the experiment in these houses should be found to work satisfactorily, the principle may be extended to other tenements. It may be added that the burners in the houses consume 5 feet of gas per hour, and the meter is so arranged that prepayment to the extent of ninepence may be made at one time.

The Progress of the Carlisle Gas and Water Works.—In the course of a speech at a recent public dinner in Carlisle, the Engineer and Manager of the Corporation Gas and Water Works (Mr. J. Hepworth) gave some interesting statistics, showing the development of the two departments during the past 20 years. It appears that since 1870 the area of the city has been extended by 458 acres, or nearly 30 per cent.; and the population has grown from 31,000 to 42,000, or 35 per cent. The public lamps have increased from 741 to 1220. The quantity of gas supplied in 1870 was 80 million cubic feet; and in the current year it will be at least 200 millions—being an increase of 120 millions, or 150 per cent. The rather singular fact is to be noticed that the water supplied or pumped in the year now shows a decrease of 4,150,000 gallons, compared with 20 years ago, notwithstanding the increased population and the extended area. This is accounted for by the stoppage of leakage. The actual gross water-rental shows an increase from £3777 to £8554 per annum. The saving of leakage represents an actual gain of £3187 a year; but it also has the more indirect effect of deferring the necessity of extending the works. The receipts for the Gas Department have in the period stated increased from £10,802 to £21,152 in the year; this being an advance of 95 per cent. These are very important facts; and it is interesting to notice that there are increasing demands for both gas and water outside the city boundary—one of the latest schemes being the extension of both to Wetheral.

PROVINCIAL GAS COMPANIES.

From the financial statements and reports of meetings of the various Provincial Gas Companies mentioned, we have extracted the particulars given in the following paragraphs.

From the report of the Directors of the Accrington Gas and Water Company which was submitted to the shareholders at their recent half-yearly meeting, at which Mr. S. Longworth presided, it appears that the expenditure on capital account was £2549 16s. 10d. during the six months ending June last; nearly the whole being for mains and service pipes, principally in connection with the laying of a new 12-inch water-main in Great Harwood, in order to use the Cliff reservoir for the supply of that place, and to increase the pressure of water in Rishton, Church, and Accrington. The revenue account generally compares very favourably with that of the corresponding half of last year; the receipts being larger for gas, water, coke, and tar. The sale of appliances for cooking and heating by gas continues satisfactory. The amount available for division enabled the Directors to recommend the usual statutory dividends of 10 and 8 per cent. per annum.

At the half-yearly meeting of the Chesterfield Gas and Water Company last Friday week, the report submitted by the Directors stated that the profit available for distribution, including £848 brought from the previous accounts, amounted to £5212, being £574 in excess of the amount at the corresponding period of last year. The accounts showed that the income from water (after deducting allowances and bad debts) was £3393, and from gas (after making similar deductions), £4568. The sale of coke and other residuals produced £790; and £5 18s. was received from rents and sundries—the total income thus being £8758. The expenditure included £1988 for the manufacture and distribution of gas; £239 for distribution of water; £515 for salaries and general expenses; £995 for rates and taxes; and £231 allowed to Directors and Auditors—making a total of £3970, and leaving £4787 to be carried to the net revenue account. The Directors recommended the payment of 5 per cent. on the whole of the capital, which would absorb £3906 and leave £1305 to be carried forward. The Chairman, Mr. R. T. Grattan, moved, and Mr. S. Burkitt seconded the adoption of the report. Mr. Markham drew attention to the charge for gas, which, he said, had always been high in Chesterfield; and he thought the time had come when they should consider the desirability of lowering it. If the price were reduced from 4s. to 3s., they would have such an increased consumption as would pay them. The Chairman replied that the idea of a reduction in the price increasing the consumption was one of the prettiest they had to deal with; but he believed it was utterly fallacious. The report was adopted; and the dividend recommended was declared.

The Chairman of the Derby Gas Company (Mr. G. Gascoyne), presiding at the half-yearly meeting last Tuesday, informed the shareholders that the total receipts had been £29,692, and the expenditure £24,621; the profit applicable for dividend being £4455. The statutory dividends of 10 and 7 per cent. would absorb £8677; and consequently there would be a deficiency of £4222 to come out of the reserve fund. This deficiency was very much due to the cost of both labour and material. The price of coal had been raised through the recent strikes; whilst the demands of their men had entailed them, as it had done other companies, in a loss which could not be overlooked. Then £4000 of capital had been spent in an unfortunate, and, he thought, an unreasonable contest in connection with their Bill before Parliament. They were, however, in a position which was perfectly sound; and when everything was completed, the shareholders would have the best and one of the most complete gas-works in the kingdom. Theirs were small difficulties in comparison with those of many other towns, which had to be met by raising the price of gas 2d., 3d., or 4d. per 1000 feet. The Directors were very unwilling to raise the price.

The shareholders of the Douglas (Isle of Man) Gas Company held their 112th half-yearly meeting on Monday last week, under the presidency of Mr. D. E. Gelling, the Chairman of the Company. In their report, the Directors stated that the net profits for the six months ending June 30 last had been £2510, which was an improvement as compared with the corresponding period of 1889. Reference was made to the completion of the new retort-house, which was notified in the JOURNAL a few weeks ago; and the Directors were pleased to say it was giving every satisfaction. They congratulated the shareholders upon possessing one of the most complete retort-houses in the kingdom. After meeting all claims for the erection of this house (which was put up from the designs and under the superintendence of the Company's Engineer, Mr. T. Newbigging, C.E.), the Directors were in a position to replace the £2000 formerly invested in Consols, which was used at the commencement of the extensions. Reference was also made to the very serious rise in the price now paid for coal, which has been the means of compelling many companies to increase the charge for gas. When the reduction was made in April, 1889, it was not contemplated that coal would rise to such a figure as it had done; and the Directors, while congratulating the shareholders upon being able to declare the same dividend as last year, anticipated that, with good management and economy, they would be able to maintain their position without making any advance in the price now charged. Including the balance brought forward from the last half year, there was available for division the sum of £4122; out of which they recommended that a dividend of £1 7s. 6d. per share should be paid, and the balance (£1600) carried forward. The Chairman, in moving the adoption of the report, referred to the completion of the new retort-house, and said the Directors looked forward to good results, alike as regards efficiency and economy, from its use. Mr. Killey seconded the motion, and it was carried unanimously. Subsequently, the Chairman proposed a vote of thanks to the Manager (Mr. W. Smith) and the Secretary (Mr. C. H. Kay), for their services to the Company. Mr. Smith, in acknowledging the compliment, said he thought the new appliances at his command would show beneficial results at the end of the current six months. A vote of thanks to the Chairman and Directors closed the proceedings. The announcement that the present reduced price of gas is to be maintained has given much satisfaction in the town, and has found expression in the local press.

The shareholders of the Eastbourne Gas Company held their half-yearly meeting yesterday week. The Directors reported that the revenue account showed a net profit for the six months of £5768, which, added to the balance brought forward after making sundry adjustments and payment of the dividend in March last, gave a total of £10,417 available for division. They therefore recommended that a dividend be declared at the rate of 13 per cent. per annum upon the £20,000 original capital, and also upon the £12,490 raised on the "C" shares, and at the rate of 10 per cent. upon the £55,000 paid-up capital raised on the "B" shares, which it was stated would absorb the sum of £4740, and leave a balance of £5676 to be carried forward. The Chairman (Dr. G. A. Jeffery), in moving the adoption of the report and balance-sheet, said there had been a very creditable improvement in the working during the past half year. The sale of gas had increased from 70 million to 78 million cubic feet; the gain being something like 10¼ per cent. This large sale of gas had been effected with a very small leakage—indeed, the smallest they had ever been enabled to report. In the corresponding period of last year it was 6·5 per cent., and in the past half year only 4·43 per cent. The report was adopted; and before the meeting terminated, a vote of thanks was passed to the Manager (Mr. J. Hammond) for the efficient manner in which he carried on the business of the Company.

Next Thursday, the shareholders of the Hastings and St. Leonards Gas Company will have submitted to them the Directors' report and the statement of accounts for the past half year. In the former it is pointed out that the increased cost of coal, labour, and all other materials required in the manufacture of gas, will in the future materially affect the cost of producing gas. Owing to the extension of the Company's business, a piece of land adjoining the works has been purchased, with a view of ultimately providing storeage for coal thereon. Some of the purifiers erected in 1865 being nearly worn out, the increasing business has necessitated replacing them with larger ones before the coming winter. Works for the manufacture of sulphate of ammonia will be shortly completed and put into operation. The accounts show that in the course of the six months £5028 of capital has been expended in the following manner: On new buildings, manufacturing plant, &c., £2361; mains and services, £460; meters, £253; stoves, £410; and land, £1542. With regard to the revenue account, it is seen that £23,846 has been received for gas; £973 as rental of meters; £5665 for residuals; and £149 from miscellaneous sources—making together a sum of £30,634. Deducting from this the total expenditure (£21,199), there remains a balance of £9435, which, with the amount brought forward from the previous half year, gives £28,720 to be dealt with by the shareholders. From this it is proposed to pay a dividend at the rate of 12 per cent. per annum on the £25 shares, and at the rate of 9 per cent. per annum on the £20 shares.

Speaking at the recent annual meeting of the Salisbury Gas Company, the Chairman (Mr. G. Fullford) referred to the loss they had sustained by the death of Mr. W. Osmond, who had been Chairman of the Directors for many years. He then proceeded to congratulate the shareholders on the fact that, after paying the interest on the debenture stock and all other liabilities, there remained a net profit for the year of £2252. The rise in the price of coal had cost £614 more than in the previous year; but fortunately an increased consumption of gas and improved prices in residual products, had enabled them to earn their dividend without resorting to raising the price of gas, as many corporations and private companies in other towns had done.

The income of the Sevenoaks Gas Company during the past six months amounted to £4398, and the expenditure to £3004. The balance of profit and loss account, being the amount available for dividend, was £2377. From this it has been resolved to pay the statutory dividends of 10 and 7 per cent. (less income-tax) on the original and additional capital respectively.

To-morrow the shareholders of the Sunderland Gas Company will hold their annual meeting, and will have submitted to them a report which states that the year which has just terminated has been an eventful period in the history of the concern, involving a large increase in the wages of the workmen, and a still larger increase in the cost of coal. It appears, however, that the Company were fortunately protected for two-thirds of the year by coal contracts at a low price; and this circumstance, combined with the increase in the price of coke and the additional demand for gas, has resulted in a diminished profit of £911 only. Contracts have just been concluded for the supply of coal to the end of the Company's next financial year (June 30, 1891) at a considerable advance in price; and it will therefore be a question for the consideration of the Directors whether to advance the price of gas or to wait until they have ascertained if the rise in coal is likely to be permanent, and in the meantime draw upon the undivided balance for the deficiency required to pay the statutory dividends. The Directors also refer with pleasure to the steady increase in the consumption of gas; no small proportion being due to the lending by the Company on hire of cooking-stoves. The number of gas-engines in use in the Company's district it is stated is increasing satisfactorily; many of them being motors of a very powerful character. The make of gas shows an increase of 8·2 per cent. over the previous year. During the year the sale of gas and meter-rentals produced £50,542; residuals, £17,604; and sundries, £430. These sums, with the balance of £12,168 brought forward from the preceding twelve months, give a total of £80,745. The disbursements amount to £54,658, which leaves a balance of £26,087. An interim dividend was paid last March; and the Directors recommend the declaration of a like dividend of 5 per cent. on the original, and of 4½ per cent. on the additional, stock.

The half-yearly meeting of the shareholders of the Wolverhampton Gas Company was held last Tuesday. The balance-sheet for the past six months showed the total receipts to be £30,733 and the expenditure, £26,677—leaving a net profit of £4106, which, added to the balance from the last accounts, made a sum of £6925. From this the Directors recommended the declaration of the usual dividends of 5 per cent. upon the consolidated stock and 3 per cent. upon the preference shares. These dividends would absorb £6271, and leave a balance of £654 to be carried forward. The report stated that the large decrease in the earnings of the Company in the half year had been caused by the increase in the price of labour, coupled with the great advance in the cost of coal and other materials used in the manufacture of gas. In moving the adoption of the report, the Chairman (Mr. J. Underhill) said the Board had found it necessary

to utilize the balance remaining upon the previous year's working, in order to pay the dividend recommended. This prevented the reserve fund being touched, and enabled them to carry £654 forward to the next accounts. But for this balance, they would have been compelled to fall back upon the reserve fund, as the price of coal and the increase in wages had greatly added to their working expenses. With the amount carried forward, they might go on for a short time longer; but by October he was afraid the Directors would have to ask for an advance in the price of gas of at least 2d. per 1000 cubic feet. Possibly it might be a little more. The motion was seconded and agreed to. In responding to a vote of thanks to the officials, the Engineer (Mr. J. Annan) remarked that, compared with two years ago, the difference in the price of coal to the Company amounted to more than £6000, and the wages to £3000; whilst the receipts for bye-products had only gone up £3000—showing a difference of £6000. He therefore considered the consumers would not think the Directors were taking advantage of them if they raised the price of gas 2d. per 1000 feet.

LANCASTER CORPORATION GAS SUPPLY.

The Annual Accounts.

The report of the Manager of the Lancaster Corporation Gas-Works (Mr. C. Armitage), and the abstract of the accounts of the department for the year ending June 30 last, have been published. The total receipts amounted to £18,543; and the expenditure to £11,613—leaving a gross profit of £6930. After deducting the interest on stock and mortgages, £3862, the contribution of £554 to the sinking fund, and £124 income-tax—making together £4579—a balance of £2351 remained; showing an increase of £577 on the previous year, notwithstanding the abolition of meter-rents and the increased cost of coal and labour. The amount of capital raised in respect of the gas undertaking is £101,500, of which £101,125 has been expended; leaving a balance of £375. Nothing has been added to this account since 1883. The reserve fund now amounts to £6620, and is on loan to the Water Department. During the past year the following extensions were made and charged to the renewal fund: Extension of gasholder, £2024; new mains, meters, and services, £1216; renewal of mains, £486; purchase of consumers' meters, £280—total, £4006. The amount standing to the credit of this account last year was £2070; so that there will now be a debit balance of £1936. The total receipts for gas, less rent for lighting, cleaning, and repairing the public lamps, were £12,123—an increase of £1319 on the preceding year; and the quantity of gas sold was greater by 11,787,300 cubic feet, equal to 12·43 per cent. The analysis of the accounts shows the cost of production, &c., which is apportioned as follows: Cost of gas, 1s. 0·03d. per 1000 cubic feet of gas sold; interest, 8·73d.; sinking fund, 1·25d.; profit, 5·28d.—total, 2s. 3·29d. The residual products realized 74 per cent. of the cost of the coals; that is to say, coal and cannel cost, on an average, 13s. 6d. per ton, and the products realized 10s. per ton—leaving the net cost of the raw material at 3s. 6d. per ton. The extension of the gasholder, referred to above, will be completed in about a fortnight from now; and a new trunk main to the town is being proceeded with. The working statement at the end of the accounts shows that 10,387 cubic feet of gas were produced from each ton of coal carbonized; and of this quantity 9887 cubic feet were sold. The gas unaccounted for was only 4·23 per cent. over the year. The 10,782 tons of coal and cannel carbonized yielded 7008 tons of coke, 136,695 gallons of tar, and 363,041 gallons of ammoniacal liquor, from which 155 tons of sulphate were manufactured.

Metropolitan Gas Company of Melbourne.—At the half-yearly meeting of this Company, held on the 28th of July, a dividend at the rate of 21¼ per cent. per annum was declared; £10,000 being added to the reserve fund, and £14,888 carried forward.

Effect of Lightning on Gas-Pipes.—During a violent thunderstorm which broke over North Staffordshire last Tuesday evening, a house at Burslem was struck by lightning. The tiles were hurled from the roof, the gas-piping was melted, and the house set on fire by the ignited gas. Before the flames could be extinguished, much damage was done. Fortunately, the tenants were away from home at the time of the occurrence.

Richmond Water Supply.—In the JOURNAL last week we noticed the fact that the Richmond Vestry had decided to apply for a further loan of £2000, to enable them to continue the adits at their new well in the Terrace Gardens. From the report presented by the Water Committee in support of this course, we learn that the original estimate for the well, adits, and pumping machinery was £6000, and that the actual cost of the work has been £5685, the result being an addition of 190,000 gallons of water per diem. The Committee regard the works so far executed as most satisfactory; for while the repayments of principal and interest on the £6000 loan amount only to £420 per annum, the value of the 190,000 gallons of water per day already secured thereby, calculated at the rate charged to the Vestry by the Southwark and Vauxhall Water Company—viz., 1s. per 1000 gallons—is £3467 10s. per annum. The total of 190,000 gallons of water per day obtained from the new well and adits, and the 206,000 per day continuously obtained from the deep well at the water-works in Water Lane, make together about 400,000 gallons per day now under the command of the Vestry, exclusive of the available auxiliary supplies obtainable from the Petersham well and the Southwark and Vauxhall Water Company. When the water-works were first instituted in 1877, there were not quite 3000 houses on the rate-books, and the rateable value of the parish was only £111,354. There are now nearly 5000 houses in Richmond, and the rateable value of the parish is £176,917 2s. 6d. Assuming that the population will soon reach 25,000, and allowing the ordinary average of 20 gallons per head per day, it would seem that 500,000 gallons of water per day is the supply really needed for Richmond. Of the total sum of £76,000 raised for the water-works, £49,110 3s. only now remains unpaid. From the general indications in the adits, there is every reason to believe that a much larger supply of water than has yet been secured may be obtained by continuing the works therein

THE SANITARY CONGRESS AND EXHIBITION AT BRIGHTON.

The Twelfth Congress of the Sanitary Institute was opened on Monday last week at the Pavilion, Brighton, under the presidency of Sir THOMAS CRAWFORD, K.C.B., M.D. As already stated, a Health Exhibition is being held in connection therewith in the Dome, Corn Exchange, and Picture Gallery. This will remain open till the 13th.

The proceedings on the first day were mainly of a complimentary character. In the morning the members of the Institute were received by the Mayor of Brighton (Alderman Manwaring), and a public luncheon took place. The Mayor presided; having on his right Sir Thomas Crawford, and on his left Sir Douglas Galton, K.C.B., &c., Chairman of the Council of the Institute. After the luncheon, the Mayor proceeded to open the exhibition. The exhibits are classified in five sections, and include building materials and machinery; appliances for water supply and sewage, heating, lighting, and ventilating; personal hygiene; foods; filters and disinfectants; and a miscellaneous section, comprising articles of sanitary interest not included in the above classes.

The first general meeting was held in the evening, when Sir J Crawford delivered his

PRESIDENTIAL ADDRESS.

Having referred in terms of regret to the death of Sir Edwin Chadwick, one of the Vice-Presidents of the Institute, the President proceeded to urge that the laws governing the origin and spread of preventible disease are not merely physical, nor merely moral, but both. As compliance with moral laws, or observance of physical laws, when tolerably clear, could not be enforced, it was to amendments in social laws that we must largely look for a remedy. Much of late had, he said, been done to amend the laws for the protection of the public health; and if the Bar and the Bench could be induced to add their influence in simplifying procedure, much would be gained. Dealing with the researches of Flügge and others into the relationship of micro-organisms to disease, he pointed out that, while there were micro-organisms whose agency was limited by the fact that the multiplication of infective material took place only under given conditions, and required the active intervention of the individual, in whose person the contagion was multiplied, to transmit it, others retained their vitality in the surroundings of the sick, after being given off from the body. The latter was therefore capable of transmission by various agencies, though the multiplication of the infecting material took place only in the body of the sick. There was presumptive evidence in favour of the views held by some that, after all, these microbes are in the main scavengers, and that it is only when the healthy human frame has been in some way weakened that they are able to find a lodgment in it. But however this might be, it was obvious that the removal and destruction of all organic matter was clearly indicated. Starve the microbe, and save the man. This important principle was too often neglected in dealing with house refuse, in the laundry system of the country, and in the kitchens of many places of public resort and entertainment. Overcrowding was perhaps the most important of all causes contributing to the origin and spread of preventable disease. The best safeguards were pure air and water, the direct light of the sun, and absolute cleanliness, with ample space in and around our dwellings. Assuming a healthy parentage in a climate like that of England, a healthy home, with regular mental and physical training under wholesome moral influences, and a fair provision of the necessary food and clothing, would secure to every member of the community a physical development proof against these disease-producing agencies. In conclusion, he expressed the belief that, with the improved laws now on the eve of passing the Legislature, there was a fair prospect of seeing the mortality reduced to 1 per cent. before the lapse of another decade.

On Tuesday the sectional work of the meeting commenced. In Section I. (Sanitary Science and Preventive Medicine), the President—Dr. G. Vivian Poore—took for the subject of his address "The Living Earth." In the course of his observations, he dealt with the

POLLUTION OF STREAMS.

Dr. Poore remarked that sanitation is purely an agricultural question; and in the country, where every cottage had, or should have, its patch of garden, there ought to be no difficulty in the daily removal of refuse from the house, and in applying it to agricultural purposes without any risk of contaminating the water supply. In 1848 the advice to drain was tendered with a light heart by the pioneers of modern sanitation. The Thames, the Liffey, the Clyde, the Mersey, and the Irwell were standing testimony to the failure of these great engineering schemes; and the last one put forward with regard to the sewage of London—to convey it all to the Essex coast and cast it into the sea—was an experiment which, like its predecessors, might be productive of unforeseen results. The panacea for all sanitary ills had been, and still was, "drainage," and the only scavenger in favour of water, notwithstanding the fact that sanitation by water had for its main characteristic incompleteness. It was true their houses were flushed; but they paid for it by fouling every natural source of pure water. He proceeded to argue in favour of keeping excremental matters out of drains; and urged that respect for the purity of water should be enforced in Board schools and churches. In conclusion, he said: "A nation that fouls its streams and starves its soil is in danger of poisoning and inanition. A nation which imports a great part of its food and a great part of its manure, and systematically, and by Act of Parliament, throws all its organic refuse into the sea, is undoubtedly living on its capital. Our capital just now is undoubtedly considerable, but we are in a fair way to run through it; and when we have done so "who can forecast the future?" In moving a vote of thanks to Dr. Poore, Sir Douglas Galton contended that air was as great a purifier as earth, and that if they turned refuse into the stream, and went some few miles down, they would find that every trace of the refuse had vanished. In the country he was in favour of cottagers applying all refuse to the land; but death-rate statistics showed that towns in which main drainage was established were healthier than those in which removal by cartage was carried on

no matter in how careful or admirable a manner. Mr. A. G. Henriques, J.P., in seconding the motion, said he thought Dr. Poore had under-estimated the influence of the air in oxidizing. With regard to the pollution of streams, Dr. Poore had by no means over-stated the case. He had in that county seen beautiful streams, direct from the chalk hills, polluted and desecrated within two or three miles of their source by villages of not more than 200 or 300 inhabitants. Dr. Poore had referred only to the country districts. The problem of the day was with large towns; and time was there a great element in the matter. Water was a ready and quick agent; and for this reason it was so much used in towns.

In the evening, Mr. W. H. Preece, F.R.S., delivered a lecture on

The Sanitary Aspects of Electric Lighting.

In the course of his remarks, he argued that, electricity and light being analogous and identical forms of energy, the former was naturally the proper source of artificial illumination; that all others, being dependent upon the absorption of oxygen, and resulting in the vitiation of the air, were injurious to health; and that the same authority that regulated the sanitation of dwellings and the supply of food should also control the purity of the air we breathe and the light we work by. With regard to the system to be employed, compact areas, covered by a radius of half a mile, were best served on the low-pressure system. Those extending beyond a radius of a mile could be supplied economically only on the high-pressure system. Everywhere the use of the electric light was increasing by leaps and bounds; and not only was it naturally the proper source of light, but economically it must eventually supplant its rivals.

Gas-Works and Public Health.

On the following day, the remaining papers in Section I. were disposed of; one by Mr. W. H. Collins, F.C.S., Gas Examiner to the Bolton Corporation, &c., on "The Alleged Danger to Public Health arising from Effluvium Nuisance from Gas-Works," being, in his absence, taken as read. The author commenced by remarking that eminent sanitarians have given it as their opinion that the public health in the neighbourhood of gas-works is seriously prejudiced by the effluvia arising from the various processes employed in the manufacture of combustible gas. Taking a number of registered results (from Manouvriez, Hoit, Powrowski, Josephson, Rawitz, &c.), it would be found that chronic poisoning is perceptible in gas-works employees; exhibiting itself in a slow pulse, weakness and depression, furred tongue, pale face, and emaciation; that carburetted hydrogen can be breathed for a short time, but eventually produces convulsions and vomiting; that ammoniacal vapour has a marked and irritating effect on the conjunctiva; that sulphur dioxide causes bronchitis; and that carbon disulphide acts upon the nervous tissue with an anæsthetic effect, culminating in deafness and even amaurosis. For these effluvia and combinations, the gas-works are responsible; though, if proper precautions be taken, the harm can be palliated, or at least lessened. Having enumerated and briefly described the operations carried on in the manufacture of gas, the author remarked that, when they are conducted with indifference, they are productive of dangerous nuisances, caused chiefly by the smoke given off during the charging and drawing of the retorts; by the generation of water gas when the red-hot coke is quenched with water; by the escape of crude gas from the mouthpieces of the retorts; by the smoke emitted from imperfectly carbonized charges; by the firing by the stoker of the tarry matter and dust accumulated in the retort mouthpiece during distillation; and by the long smoky flame issuing from the retort when the lid is removed, on account of a stoppage in the ascension-pipe. The noxious gases flowing from the retort-house ventilators are very quickly dissipated; and by the use of a "destructor," a chimney-stack can be removed from the circulating atmosphere altogether. From the condenser no unpleasant effect arises; and the washer or scrubber pollutes the air to a trifling degree only. The purifier-house, however, is a source of nuisance unless discrimination is shown in the selection of absorbents. If lime is used for removing the carbonic acid alone, all is well; but when it is used for the sulphur compound in addition, the stench is most offensive, for sulphuretted hydrogen and bisulphide of carbon are released, creating a disgusting and poisonous nuisance. The lime should therefore be confined to the removal of the carbonic acid; while for the absorption of the sulphur compounds, iron oxide should be exclusively employed, when the nuisance will be reduced to a minimum. The utilization or working-up of the ammoniacal liquor, and its subsequent manufacture into sulphate of ammonia, are other objectionable sources. All these facts, the author thought, go to prove that the sanitary authorities of our town should rigorously overlook the local gas-works, and see that every preventive method is carried out to lessen the nuisances that seem bound to result in some degree from the operations there carried on, but which, by proper supervision, can be rendered well-nigh impotent.

The proceedings in Section II. (Engineering and Architecture) were opened with an address on "Baths," by the President of the Section, Professor Roger Smith, F.R.I.B.A. This was followed by an interesting paper by Alderman W. H. Hallett, F.L.S., J.P., D.L., on the "Brighton Water-Works." This, with one on "Water-Works Regulations," by Mr. R. E. Middleton, we are compelled to hold over.

On Thursday, the proceedings consisted of a conference of medical officers of health, and the reading of other papers in Section II. Only two call for notice here—viz., those dealing with

Sewage Treatment and Disposal.

Major C. R. Conder, R.E., read a paper on "The Iron Process as Applied to the Disinfection of Sewage in Barracks and Dwelling-Houses." He claimed for the process that it rendered practical, at small cost, the proportional dosing of sewage, with iron in solution; the result being the disorganization of the sewage into inorganic elements, producing a silt easily dried, and a pure effluent within the requirements of rivers pollution committees. By the process, he said, offensive odours are destroyed and bacterial germs killed; and if the silt were used as manure, the soil was not polluted as in sewage farms, where no similar process was adopted. In the discussion on the paper, Dr. A. Carpenter emphatically denied the statements with regard to the pollution of the soil by sewage farms, and said the destruction of the material in human sewage was contrary to all political economy, and that therefore these iron processes were to be condemned. He contended that properly constructed sewers bred no sewer gas; and if the sewage were placed on the land within (say) three hours of its discharge, no harm could befall. Under very special circumstances, the use of sulphate of iron might be proper; but he contended that over large areas it was mischievous.

Mr. R. F. Grantham, M. Inst. C.E., followed with a paper on "The Disposal of the Sewage of London upon the Maplin Sands." He said that, in disposing of London sewage, they must be guided rather by the particular circumstances than by methods which had been actually tried in smaller towns. The average daily quantity of Metropolitan sewage was at the rate of 19,000 cubic feet per minute, equivalent to a river 40 feet wide at its water surface, 5 feet deep, and flowing continually at the rate of about 2 feet per second. It was estimated also that in quantity there would be about 4500 tons per diem of wet sludge, and about 900 tons per diem of pressed sludge in cakes. Further alluding to the report of the Royal Commissioners, he said that, considering the strong consensus of opinion against any chemical treatment of the sewage, and in view of the difficulties already attending its disposal on land, there would appear to be only two courses open—either that the liquid should be discharged at Hole Haven, or that it should be dealt with on the Maplin Sands. Maplin Sands had all the advantages claimed for Canvey Island, with that of being much larger in extent and of being removed far away from Southend, or any watering-place; and instead of a fertile tract of land being rendered valueless for agricultural purposes, a piece would actually be added which might be made exceedingly fertile and valuable. The estimate for the work, exclusive of the cost of land and foreshore rights, was £4,500,000. The area through which easement would be required would be about 200 acres. The working expenses of cultivating the enclosed irrigated area would, it was anticipated, be in great measure covered by the returns of the crops yielded. In the course of the remarks to which the reading of the paper gave rise, the President of the Section (Professor Roger Smith) remarked that the paper was one of the most important that had been presented to the congress, and said he hoped it would be well discussed. Mr. J. Lemon, M. Inst. C.E., Borough Engineer of Southampton, complimented the author on his paper, but expressed the opinion that the system of one process for all districts was utterly wrong. It would, he thought, be cheaper to deal locally with the sludge than to take the whole of it to Maplin Sands; in which case the expense would be enormous and hardly justifiable. Dr. A. Carpenter said the paper should be brought before the London County Council. He thought the disposal of sewage on one site a mistake; the establishment of a number of sewage farms would be better. It would be more desirable, instead of wasting the sewage, to distribute it over an area where it could fructify. With people so much in need of meat and milk as Londoners were, it was criminal to destroy so valuable a means of producing these commodities.

On Friday the proceedings comprised a conference of sanitary inspectors, under the presidency of Dr. A. Carpenter, and the reading and discussion of papers in Section III. (Chemistry, Meteorology, and Geology). The President of this Section—Mr. W. Topley, F.R.S., F.G.S.—took as the subject of his address "Geology in its Relation to Hygiene, as Illustrated by the Geology of Sussex." Dr. A. W. Scatliff read a paper on "A Case of Well Pollution Undetected by Chemical Analysis;" and one by Dr. Percy Frankland, on "Lead-Poisoning from Soft Water Supplies," was taken as read. Notice of these communications must be deferred.

The business of the congress then closed; Saturday being devoted to excursions.

The Jubilee of the Belfast Water Trust.—The annual inspection by the Belfast Water Commissioners of their water-works at Woodburn was recently made; and everything was considered to be in a highly satisfactory condition. As usual, this event was followed by a luncheon, after which various toasts were proposed—one being "The Health of the Water Commissioners." In responding, the Chairman (Mr. Carlile) remarked that the interest attached to the inspection of the works that day was greatly intensified by the fact that it was just fifty years since the Board was first incorporated under the Act of 1840, and that the proceedings might be taken as celebrating in a degree the jubilee of the Water Trust. He then gave an outline of the history of the water supply of the city, in the course of which he stated that in 1841 the total revenue of the Trust was £2813; and the consumption was probably under a million gallons per day. Now the rates received for domestic supply amounted to £18,000 per annum; and for special or business purposes, to £19,000. The quantity of water that could be supplied by the Commissioners was something like 11 million gallons per day.

The Wakefield Rural Sanitary Authority and Lead-Poisoning.—According to a report which has been laid before the Wakefield Rural Sanitary Authority, it appears that four samples of Soothill water taken at different points in their district have been submitted to analysis, in order to test its capacity for taking up lead. In one sample no lead was perceptible; but it was found to have a great tendency to take up lead when allowed to stand in pipes upwards of 24 hours. The other samples had been drawn from different lengths of pipes measuring respectively 97, 88, and 76 yards. These showed the presence of lead to the extent of 0·10 and 0·05 grain per imperial gallon. When these samples were taken for analysis, the Wakefield water had been off for eleven days; thus allowing a fair test independent of the reflux-valves. A letter from the Analyst stated that such amounts of lead may prove injurious in the case of highly sensitive persons; but as a rule serious cases of lead-poisoning arise from drinking water containing larger proportions than one-tenth of a grain of lead per gallon. Following up the receipt of these analytical reports, the Engineer of the Authority caused the removal of several lengths of the lead mains belonging to them in the district of West Ardsley; and they were superseded by a service of 2-inch cast-iron pipes.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

A new question of great importance has suddenly been sprung upon the Edinburgh and Leith Gas Commissioners, in the proposal of the North British Railway Company to acquire their works in Edinburgh for the purpose of making the site into a goods yard. I suppose your readers are aware that, since the opening of the Forth Bridge, the Railway Company have felt it an imperative duty to re-arrange their principal station—the Waverley—to adapt it for the greatly-increased traffic which has resulted. Part of this re-arrangement, everyone admits, must consist of the removal of a goods yard which at present occupies half the site; and in order to accomplish this, it is proposed to take the gas-works, which lie to the east, a very short distance off. Formal notice was given to the Town Council on Tuesday, in a letter from the General Manager of the Railway Company which was read. The question is mixed up with competing proposals by the Caledonian Railway Company, which do not affect the gas-works at all; and the Council, before considering either of the proposals, passed a resolution calling upon both Railway Companies to lay a definite scheme before them. The site of the Edinburgh Gas-Works contains 4½ acres, and is very suitably situated for railway purposes. It will, however, be a costly subject to acquire. The works stand in the books of the Gas Commissioners at about £100,000, which does not include the value of the site; and before this is added, together with compensation for disturbance, the Railway Company will find that they will have to spend money freely. Of course, the question has been forced upon them, and they cannot avoid doing something. In March, 1887, Mr. John Walker, the General Manager, was examined before Lord Balfour's Committee in support of the Edinburgh Gas Company's Bill, when they proposed to remove the works to a new site at Niddrie; and he then said that "the North British Railway Company had not the slightest idea of acquiring the site of the Edinburgh Company's present works, as to utilize it they would have to purchase two valuable breweries." The subject has been sprung suddenly upon the Gas Commissioners. They have no meeting during August; and consequently have not had an opportunity of considering it as a body. Individual Commissioners, whose opinions I have been able to get hold of, are not averse to the proposal; and I have heard, at second hand, that some of them think they might adapt the Leith works for the supply of both Edinburgh and Leith. It requires little demonstration to show that if such a notion is entertained by anyone, it need not be carried further, because, although it might not be impracticable, it would be exceedingly unprofitable. The Edinburgh works, capable of producing 4½ million cubic feet in 24 hours, are far too crowded upon 4½ acres of ground; the Leith works, upon 2½ acres of ground, were in 1887 capable of producing more than 2 million feet, and were estimated by Mr. F. T. C. Linton, the Engineer, to be capable of adaptation to produce only 4 million cubic feet. Were 7 million cubic feet per day required to be produced in the Leith works, they could only be capable of doing it by the removal of the purifying plant to another site, which would be a costly and almost unworkable scheme; and even then the storeage would be so limited that the work of carbonization would be a task that no one would care to be engaged in. I am afraid if the Railway Company succeed in their proposal to purchase the Edinburgh site, the Gas Commissioners will require to look in another direction for ground on which to erect new works. A more feasible scheme would be to acquire a larger site on which to erect works which would serve for the whole supply, and to dispose of the Leith works. A purchaser for them might be found in the Caledonian Railway Company, who are in quest of a connection with the southern end of Leith, where the gas-works are. The site which the Edinburgh Gas Company had provisionally purchased at Niddrie in 1887, is, if I mistake not, still available, and a more suitable could not be found; besides which, Mr. Robert Mitchell, the Engineer of the Edinburgh works, had then prepared, and has still in his possession, a series of plans for the erection of works which would have been probably the most conveniently situated and most easily carried on of any gas-works in the kingdom. They would actually have been built upon ground from which coal is being worked, and on a foundation of boulder clay 50 feet in thickness, through which no deleterious substances could have found their way to other properties. A stream runs along the southern boundary, which would have furnished abundant water; and the railway communications are such that both high and low level rails could be run into them from different lines. The site extends to 93 acres, and the price at which it was to be sold to the Edinburgh Gas Company in 1887 was £25,000. This is, however, reasoning in advance; and I need not pursue the subject further until there is a development—which must be soon, if Parliament is to be applied to next year for powers.

There is a large manufacture of gas-meters in Edinburgh, and the Corporation maintain a testing department, the revenue of which amounts to about £1200 a year. There is an accumulated fund amounting to £7500, which there is no prospect of requiring to be applied to the purposes of the department; in these circumstances, notice of motion has been given in the Town Council to have it transferred to another account—whichever the Council may select as the most beneficial to the city.

The Edinburgh Town Council is to meet on Tuesday next to consider the notices for electric lighting which have been lodged, and to resolve upon the action they are to take. There is a general feeling that whatever measures are adopted for the introduction of electric lighting should be in the hands of the Corporation.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

When the vacancy in the managership of the Dawsholm works of the Glasgow Corporation Gas Trust (caused by the resignation of Mr. Terrace) was by filled the appointment, some time ago, of Mr. Alexander Wilson, of the Nine Elms Gas-Works, the subject gave rise to some remarks at a Town Council meeting, regarding the desirability of advancing Mr. Key, of the Tradeston works, to what was supposed by some members to be the higher post, and at the full salary attaching to the Dawsholm managership. The Convener of the Works Sub-Committee objected to the matter being brought up at a Town Council meeting; which, in his opinion, was both a most unusual and an imprudent course. The Convener of the Sub-Committee on Finance, however, remarked that he had no doubt that, when the proper time came, the Gas Committee would advance the position of Mr. Key. Mr. Mechan, the Convener of another Sub-Committee, was of opinion that Mr. Key was entitled to some encouragement, as the manufacture of gas was three times as great as it was when he was appointed to take charge of the Tradeston works. The time for giving him the encouragement referred to seems now to have arrived. At all events, the matter will, I am told, come before the Town Council meeting next Thursday in regular form; the proposal to be made in connection with it being that Mr. Key's salary be advanced to £350 per annum. I have been informed that a recommendation to this effect will come from the Gas Committee. If that be the case, it is not at all likely that the proposed advance of salary will be negatived. I suppose the bonus hitherto paid to him on account of successful results in working will still be continued, with possibly an increase. Mr. Key has now much greater responsibility than he has hitherto had.

While speaking of Mr. Key, I may mention the fact that the system of ventilation which he devised and carried out some months ago in the Victoria Hospital (which was recently erected in one of the southern suburbs of Glasgow), and in connection with which a powerful "Otto" gas-engine is employed, is to be described and illustrated in a treatise on "Ventilation," which is being prepared for publication by a well-known sanitary engineer of this city. It is, I believe, to be a companion to his text-book on "Plumbing" in "Weale's Series."

It is expected that active steps will very shortly be taken for putting in operation the provisions of the Glasgow Electric Lighting Provisional Order, which recently received Royal Assent. It has not yet been determined by the Glasgow Corporation whether the Provisional Order shall be administered by the Gas Committee, or by a Special Committee appointed for the purpose. It is urged on some hands that the administration of the terms of the Order would be safer in the hands of a Committee elected for the purpose than in those of the Gas Committee, as with the latter body the interests of the "new light" undertaking might be sacrificed to those of the "old light." There is likewise the fact (alleged, at all events) that the sixteen or eighteen gentlemen who form the Gas Committee have to submit to a very large inroad being made on their business time by the duties devolving on them in the administration of the Corporation gas affairs. But the matter will probably come up for decision at the next Town Council meeting.

Reverting briefly again to the subject of coal supplies for various gas companies and corporations, I find that the difficulty of making purchases at reasonable prices is becoming greater and greater from day to day. I am told of one gas company whose purchases were not completed, having, within the past few days, had to pay somewhat smartly for the additional coal wanted. Splint cannel was secured at 14s. per ton delivered at the works; the advance on the rate ruling a year ago being somewhere about 6s. 6d. per ton. For the same concern Lanarkshire "pugs" were purchased at 11s. 6d. per ton, at an advance on last year's prices of about 3s. 6d. for the same kind of coal. I may mention that the undertaking is in the Hamilton district, and that some six or eight colliery firms in that district were asked to tender. Nearly all of them declined to send in tenders. The head of one firm was asked to make an offer; but as he is one of the Directors of the Gas Company, he was inclined not to do so. On being pressed, however, he filled up an offer and duly sent it in; but with the price put so high that he felt certain he would be left "out in the cold" when the fixing came on. Strangely enough, his was the only offer; and it was accepted. I am told that the Stirling Gas Company's coal contracts are about to be settled, if they have not already been closed within the past day or two. For the Falkirk Gas Company, purchases have just been made of some 3000 tons of Slamannan shale at 12s. 3d. per ton, or 4s. 6d. higher than the same material was obtainable at a year ago. Some 4000 tons of splint coal have also been purchased from the Callander Coal Company, and from the Carron Iron Company; but at what prices I have not been able to learn—at an advance, no doubt. Some of the colliery-owners and coal merchants are wondering when the additional supplies of coal are to be asked for by the Glasgow Corporation Gas Committee, and also where they are to be had when asked for. There are, it is said, about fifteen or eighteen collieries that produce splint coal such as finds most favour with the Glasgow Gas Committee; but they are already so well sold forward in most instances that they are not likely to have much to spare for Glasgow's wants. Even as it is, there is in very many instances great difficulty in getting supply where there are contracts running.

There has been a decided pause this week in the upward movement in the price of Scotch warrant iron; and business in the "ring" on 'Change, with the exception of Monday, has been less active. The tone, however, has been very firm, while the fluctuations in price were at no time very severe. On Monday, Scotch pig iron touched 50s. 7d. per ton cash; and on Wednesday the price was down at 49s. 9½d.—these rates marking the highest and lowest prices of the week. Cleveland and hematite iron moved in sympathy with Scotch iron prices, the former being 6d., and the latter about 1s. per ton lower on the week. Makers report an improving demand.

The coal trade is very firm all round, and in some cases prices appear to be still hardening. From the circulars which coal masters have issued this week, it is very evident that house coal will very generally be advanced in price on Sept. 1, to the extent of 1s. per ton. Steam coal is quoted at 11s. 6d. per ton for the best qualities, which are rather difficult to secure.

A report of the local sulphate of ammonia market for last week says: The sulphate of ammonia market still continues firm, at about the same price as stated in last week's report. Business for spot has been done at £11 12s. 6d. per ton, usual terms, f.o.b. Leith. The stocks in makers' hands are decidedly low, having been pretty well cleared out by the large Glasgow shipment. Price for forward delivery remains firm.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 30.

Sulphate of Ammonia.—A good business has been done during the week; and prices are well maintained. The quantities available for prompt delivery remain in a very small compass; hence it seems improbable that, even without pressing orders, values will in any way be likely to suffer, especially as a fair portion of the September production has already been disposed of. For spot lots, £11 12s. 6d. and £11 15s. has been paid both here and at Hull, according to quality. At Leith there have been buyers at £11 12s. 6d. Some contracts have been made to the end of the year at full values; and there seems a general inclination to view the future more favourably than in former years.

LONDON, *Aug.* 30.

Sulphate of Ammonia.—The market has improved; and a fair business has been done at £11 12s. 6d. to £11 13s. 9d. The Beckton value is given at £11 15s.; but we have heard of no sales at this figure as yet, although it is probable it will have to be paid ere long.

Tar Products.—There has been again considerable excitement in the benzol market; and sales have taken place at 4s. 3d. for 90 per cent., and 3s. 4d. for 50/90. Higher prices are still looked for, and may be realized if the present strong demand from the Continent continues. Anthracene has improved in value; and sales are reported at 1s. 5d. for "A" quality, and 1s. 1d. for "B" makes—1s. 6d. and 1s. 2d. being the respective prices now asked for this article. There has been a good inquiry for pitch during the week; and sales have taken place at 28s. and 28s. 6d. The Beckton price is 29s.; and this quotation may be taken as present value. The coal market being in such a firm condition, pitch would appear almost certain to see higher prices before many weeks are over. Creosote oils and carbolic remain unchanged.

The Water Supply of Denby.—Last Wednesday week, Colonel C. H. Luard, one of the Inspectors of the Local Government Board, held an inquiry at Denby into an application by the Local Board for sanction to borrow £6000 for works of water supply. Evidence was given showing the necessity for a proper service of water; and it was stated that the ratepayers themselves had, at a public meeting in May last, passed a resolution calling upon the Board to provide an adequate supply. The scheme which the Board have adopted is estimated to cost £5650. The inquiry was adjourned to October.

The Northern Coal Trade.—There has been an increased demand for gas coals lately, especially for local uses. Steam coals are steady at about 13s. per ton free on board, for best Northumbrian qualities; second classes and small steam coals being a little easier. The working of the Welsh coal trade has now had its effect in lessening the demand for bunker coals. As above stated, gas coals are firm; and at most of the local towns the consumption is increasing. It transpired at the recent meeting of the West Hartlepool Gas Company that it is now using no less than 2000 tons of coal monthly through the year—a large advance on past figures. And this is a type of the improvement in demand at all the local ports, which have benefited and are benefiting from the increased activity in trade, and the consequential improvement in the demand for gas. The companies are, however, stocking coal more freely than they did last year. Household coal has been very flat, and the price is weak. There is a good demand for manufacturing fuel. Coke is a little steadier. For gas coke, the demand is fair; but the production is increasing, and stocks are being enlarged in a few instances.

The Thames and Its Condition.—As mentioned in our article on "Water and Sanitary Affairs" last week, a lecture was recently delivered before the Balloon Society, at St. James's Hall, Piccadilly, on "The Thames, and what its Condition Forebodes," by Dr. R. T. Cooper. The lecturer urged the importance of rivers from a sanitary point of view, and the necessity that exists for maintaining them in a condition of full and sufficient activity. From the statements of various observers he quoted, he showed that several circumstances are contributing at the present time to exhaust the springs and streams; and this consequently deteriorates the rivers. He mentioned the importance of the Thames to a great city like London; and he contended that the aim not only of Londoners but of the inhabitants of the whole British Empire ought to be to make the river in all respects an example of efficient management to all countries. In order to effect this he argued that it was absolutely necessary to attend not only to the river channel, but to place the entire catchment area of the river under efficient supervision, and to empower the Conservators to compel adjoining landowners to abstain from undertaking any agricultural drainage or forest clearances that would be detrimental to the maintenance of the free and healthy flow of the river. The water of a river ought to be in a perfect condition, so that animals or even men might drink it. The Thames was gradually losing the force and body it possessed years ago. The cause was the terrible neglect of the uplands and the sources of the river; and if things went on as they had been going, the Thames would very soon cease to be. Mr. W. H. Le Fevre, C.E. (President of the Society), moved the following resolution: "That the maintenance of the Thames in a natural, full, and freely-flowing condition is of such great importance to the well-being of the inhabitants of London, as well as of the residents in towns within its catchment area, that it behoves us all to use our efforts to induce the constituted authorities to pay more attention to it than has hitherto been done." He remarked that, with all due deference to the Thames Conservancy, the London County Council was the body which should have the control of the river, as being the representative body of the people. The motion was adopted. Mr. Youll moved: "That the entire charge of the River Thames should be given to the London County Council," and observed that the Council ought to be responsible for the river from one end to the other. Mr. Ingram urged the meeting not to pass the resolution, as in his opinion the London County Council was not the description of body which should have so onerous a task imposed upon it, as it had shown itself singularly wanting in judgment. The resolution was negatived.

The Proposed Acquisition of the Dalton Gas-Works by the Local Board.—At the monthly meeting of the Directors of the Dalton Gas Company last Wednesday, it was unanimously decided not to transfer the gas-works to the Local Board; the terms not being deemed satisfactory.

The Lancashire Coal Trade.—Business was quietly steady during the past week, and prices show little or no change from the previous quotations. Where there has been any change, it has been in an upward direction; but there is a want of uniformity. The following prices rule: Best house coal, 11s. 6d. to 12s. per ton at the pit's mouth, with 10s. 6d. to 11s. for seconds; commoner sorts, 9s. to 9s. 6d. per ton. Burgy, 7s. 6d. to 8s. for ordinary descriptions, and 5s. 6d. for slack; better qualities running up to 7s. per ton. There has been a fairly active demand for shipment; and prices are firm at 10s. to 10s. 6d. per ton for ordinary descriptions of steam coal delivered at the Liverpool Docks.

Alarming Gas Explosion at Walsall Station.—An explosion of gas, which occasioned considerable alarm, but which fortunately was unattended with serious consequences, took place at the London and North-Western Railway Company's station at Walsall last Thursday evening. It took place in a sitting-room between the first and second class refreshment-rooms on No. 2 platform. About seven o'clock one of the barmaids went into the sitting-room to light the gas. She did not perceive any smell of gas, nor, indeed, did anything unusual happen until a quarter of an hour afterwards, when the lights in the refreshment-rooms were turned up. Then there was a loud report; the window-frame of the sitting-room and two of the heavy window-frames in the refreshment-rooms were blown out, and carried on to the rails, eleven large panes of glass were broken, and much of the glassware on the counters and shelves in both rooms was smashed. It appears that there was a small three-light slide chandelier in the sitting-room; and it was found that gas had escaped from this near the ceiling, and accumulated in the space between the ceiling and the roof, and that the heat from the lights had ignited it.

Wolverhampton Corporation Water Supply.—The report of the Wolverhampton Corporation Water Committee for the year ending March 31 last (submitted and adopted at a meeting of the Council a few days since) states that, after paying interest charges on the capital and providing for the sinking fund, the profit for the year amounted to £3020. There was an excess of £911 in the sales of water compared with the previous twelve months. During the year, the report continued, the Bilston Commissioners resolved to take steps to construct waterworks for the purpose of supplying their township with water at a less cost than that now paid to the Corporation under the existing agreement. The Council, therefore, upon the recommendation of the Committee, commenced an action in the Chancery Division of the High Court of Justice to restrain the Commissioners from breaking such agreement. The matter was still *sub judice*. The Bilston Commissioners also promoted a Bill in the present session of Parliament, to enable them to afford to the inhabitants of their district such a supply of water for domestic purposes as they might from time to time require, over and above the minimum quantity stated in the statutory agreement, which they alleged was the only quantity they were required to take under that agreement. The Bill came before a Select Committee of the House of Commons, who after hearing the witnesses of the promoters, decided that the preamble was not proved. The Commissioners, nevertheless, were defending the action now pending in the Courts of Law. Annexed to the report were statistics showing that in the borough there are about 17,000 houses, of which 15,500 are supplied with water by the Corporation. There are, therefore, 1500 houses in the borough, the inhabitants of which are still dependent upon wells for their water supply. There are 7626 houses outside the borough supplied with Corporation water. The number of meters in use by consumers is 232.

Gas and Electricity in the Laundry.—A recent number of the *Laundry Journal* reproduced the article on "Gas in the Laundry" which appeared in our columns on June 17 last. In some comments on the article, our contemporary made the following remarks on the use of gas and electricity for laundry purposes. For a good many years laundry-men have been accustomed to use gas in their daily avocations, with satisfaction to themselves and much real service. But although gas—at first as a heater, and later on as a motive force—has been extensively introduced in laundries, there are those among practical laundry working people and laundry engineers, who think it might be made to play even a more important part, with great advantage to the laundry trade. According to these observant and practical-minded persons, gas has a much wider field than has hitherto been allowed to it. Certain it is that iron-heating stoves and small and large machine-irons (whether roller or flat ironers) have given excellent results when worked by gas. Whether this domain is to be further extended depends partly on the ingenuity of laundry engineers and partly on the gas companies. On the whole, we are decidedly inclined to think that at no very distant date the laundry trade will become even greater patrons of the gas companies than they have hitherto been. Those who have had experience in such matters, and have taken the trouble of going into profit and loss calculations, declare that laundrymen would gain largely if they could use nothing but gas both for heating purposes and motive power. This would undoubtedly do away with many drawbacks against which laundrymen have at present to contend—notably, dust and dirt. If we look down the lists of patents taken out during the year for devices in connection with laundressing, we at once see that gas takes a prominent place as a means towards various ends aimed at by ardent inventors. Turning in another direction, we see that electricians, like their brother gasmen, have of late been paying considerable attention to the laundry world. Not many months ago an application was filed at the Patent Office for a patent upon a device for heating and cooking by electricity; special stress being laid upon its adaptability as a heater for flat irons. As a heating agency, electricity has been experimentally applied to roller and flat machine-ironers; and perhaps we may hear a good deal more on this head at no distant date. For the present, laundrymen have better reason to look with confidence and hope to the gasmen. Gas in the hands of contriving laundry engineers has done much to help the laundry trade; and seemingly it may yet do much more for us.

The "Wilson" Stoves.—A new heating-stove, named the "Parisian," has just been added to the large selection of Messrs. Charles Wilson and Sons, of Leeds. The stove is square-built, something after the principle of their well-known "Elegant" stove, and is made specially for the French trade. It is relieved in nickel or brass, and makes a splendid accessory to a drawing-room.

Strike of Gas Stokers in Melbourne.—According to a telegram in *The Times*, all the stokers employed in the Melbourne Gas-Works went out on strike last Wednesday, as a protest against the employment of non-unionist men to unload coal. The result was that on the following day there was a greatly diminished supply of gas, and the streets were only partially lighted. Other men were obtained to take up the work; but numerous attempts were made to interfere with them.

Competing Gas Companies at Cadiz.—The Madrid correspondent of *Industries* says a curious case in gas business is reported from Cadiz, where a French company and a local one are competing. The first supplies, at a heavy loss, about one-fifth of the consumption; the other, although selling at a price 25 per cent. above, cannot pay any dividend at the present cost of coals. At the same time they dare not raise the price of gas for fear of losing customers.

The Water Supply of Glass Houghton.—Colonel C. H. Luard, R.E., has held an inquiry at Glass Houghton respecting an application made by the Sanitary Authority to the Local Government Board for permission to borrow £1030 to carry out works to enable them to obtain Wakefield water from the Whitwood Local Board at the rate of 10d. per 1000 gallons, which price the Whitwood Board have agreed to, and the Wakefield Corporation sanctioned.

Electric Lighting at Weybridge.—The Chertsey Rural Sanitary Authority have given their consent to the granting of a Provisional Order by the Board of Trade, to authorize the supply of electricity in Weybridge by the Laing, Wharton, and Down Construction Syndicate, Limited. This Syndicate, it will be remembered, have for some time been lighting the parish by electricity by means of overhead wires. One of the conditions attached to the giving of the consent of the Authority is that the overhead wires shall be removed and laid underground within a period of two years from the commencement of the Order.

Tottenham and Edmonton Gas Company.—The annual meeting of the shareholders of this Company was held last Saturday, when the Chairman (Mr. G. Gripper) moved the adoption of the report and accounts for the past six months, which were noticed in last week's JOURNAL (p. 457). He pointed out that the increase in gas-rental, as compared with the corresponding period of last year, was £4 18s. 1d. per cent., and the percentage of additional gas sent out was 5·90. He referred with great satisfaction to the sale of stock by tender during the half year, which, he said, fetched an average price of £168 per cent. Several shareholders, in the course of the meeting, congratulated the Directors and officers on the report, which was unanimously adopted. Our report of the proceedings will be given next week.

Lead-Poisoning in the Bradford District.—In the course of a long article bearing this heading which recently appeared in the *Bradford Observer*, it is stated that the question of lead-poisoning is again being brought before the attention of the Bradford Corporation by several of the authorities in the districts which are supplied with water by that body. Complaints of the epidemic are numerous; and in one case, that of a man living at Pudsey, death has resulted from drinking the impregnated liquid. In each case the mischief has been caused by water from the high-level system, which appears to have a peculiar property in extracting lead from the pipes through which it has to pass before reaching the houses of the consumers who are or have been affected. In these circumstances our contemporary says that it is obvious an inquiry as to the whole subject is necessary; and it hopes that a proposal set on foot nearly a year ago, that the Local Government Board should investigate the matter, will ere long be carried out.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 491.)

Issue.	Share	When ex-Dividend.	Dividend per Year's Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Apr.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	,,	7½	Do. 7 p. c	10	12½—13½	..	5 11 1
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	107—109	..	4 11 9
100,000	20	30 May	8	Bahia, Limited	20	20—22	..	7 5 5
200,000	5	15 May	7½	Bombay, Limited	5	6¾—7¼	..	5 3 5
40,000	5	,,	7½	Do. New	4	5—5¾	..	5 9 1
380,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	212—217	..	5 12 11
125,000	,,	,,	9½	Do. New	100	155—160	..	5 15 7
220,000	20	13 Mar.	11½‡	Brighton & Hove Original	20	40—42	..	5 9 6
320,000	20	28 Mar.	11½	British	20	43—45	..	5 0 0
50,000	10	13 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—14	..	5 14 3
328,750	10	13 June	8	Buenos Ayres (New) Limited	10	12½—13½	..	5 18 6
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	103—106	..	5 13 2
150,000	20	14 Aug.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Apr.	13½	Commercial, Old Stock	100	252—257	..	5 7 0
130,000	,,	,,	10½	Do. New do.	100	200—205	..	5 4 10
130,000	,,	27 June	4½	Do. 4½ p. c. Deb. do.	100	117—122	..	3 13 9
557,320	20	13 June	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	,,	13	Do. New '69 & '72	14	33—35	..	5 4 0
200,000	20	,,	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	195—205	..	4 17 7
234,060	10	16 July	—	European, Limited	10	18—20	..	—†
120,000	10	,,	—	Do. New	7½	—	..	—†
354,060	10	,,	—	Do. do.	5	—	..	—†
5,470,620	Stck.	14 Aug.	13	Gaslight & Coke, A, Ordinary	100	236—241	..	5 7 10
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	98—101	..	3 19 3
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	250—255	..	3 18 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	119—123	..	4 1 3
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	177—182	..	4 2 5
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	161—166	..	4 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	250—255	..	3 18
1,061,150	,,	13 June	4	Do. 4 p. c. Deb. Stk.	100	115—120	..	3 6 8
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	123—128	..	3 10 4
650,000	,,	,,	6	Do. 6 p. c. do.	100	163—168	..	3 11 5
3,800,000	Stck.	15 May	12	Imperial Continental	100	220—223	+1	5 7 7
75,000	5	13 June	6	Malta & Mediterranean, Ltd.	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p. c. Deb.	100	112—114	..	4 7 9
541,920	20	13 June	6½	Monte Video, Limited	20	19—20	..	6 10 0
150,000	5	30 May	10	Oriental, Limited	5	9—9¼	..	5 5 3
60,000	5	28 Mar.	7	Ottoman, Limited	5	5¾—6	..	5 16 8
166,870	10	16 July	4	Park Limited	10	3¾—4¼	..	8 17 9
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	98—102	..	5 17 8
500,000	100	2 Dec.	6	and Do.	100	95—100	..	6 0 0
150,000	10	16 Apr.	10	San Paulo, Limited	10	14—15	..	6 13 4
500,000	Stck.	28 Aug.	13½	South Metropolitan, A Stock	100	280—285*	..	4 12 11
1,350,000	,,	,,	11½	Do. B do.	100	225—230*	..	5 0 0
141,500	,,	,,	12	Do. C do.	100	235—245*	..	4 17 11
650,000	,,	27 June	5	Do. 5 p. c. Deb. Stk.	100	140—145	..	3 9 0
60,000	5	27 Feb.	11½	Tottenham & Edm'nton, Orig.	5	11—13½	..	4 8 5
						*Ex.div.		
				WATER COMPANIES.				
728,446	Stck.	13 June	9½	Chelsea, Ordinary	100	267—272	..	3 9 10
1,720,560	Stck.	16 Apr.	7½	East London, Ordinary	100	212—216	..	3 9 5
541,440	,,	27 June	4½	Do. 4½ p. c. Deb. Stk.	100	142—147	..	3 1 2
700,000	50	13 June	9	Grand Junction	50	120—124	−1	3 12 7
708,000	Stck.	14 Aug.	10½	Kent	100	270—275	..	3 16 4
1,043,800	100	27 June	9½	Lambeth, 10 p. c. max.	100	248—253	−2	3 15 1
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	122—126	..	3 3 6
500,000	100	14 Aug.	12½	New River, New Shares	100	361—366	..	3 6 3
1,000,000	Stck.	31 July	4	Do. 4 p. c. Deb. Stk	100	125—128	..	3 2 6
902,300	Stck.	13 June	6	S'thwk & V'xhall, 10 p. c. max.	100	170—174	..	3 9 0
126,500	100	,,	6	Do. 7½ p. c. do.	100	158—163	..	3 13 7
1,155,066	Stck	13 June	10	West Middlesex	100	265—270	..	3 14 1

† New reconstruction of capital affords no data at present.
‡ Next dividend will be at this rate.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

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HYDRAULIC AND GAS ENGINEERS,

ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co. for Gas Exhausters, &c.

They have completed Exhausters to the extent of 29,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

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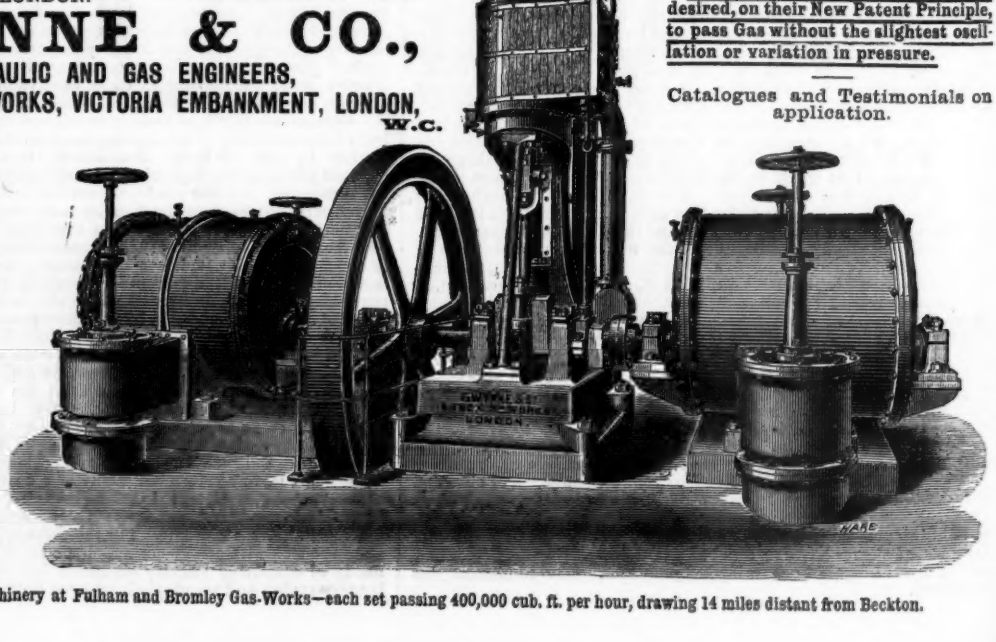

Exhausting Machinery at Fulham and Bromley Gas-Works—each set passing 400,000 cub. ft. per hour, drawing 14 miles distant from Beckton.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

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O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
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JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
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SULPHURIC ACID, B.O.V., for Sulphate of Ammonia Making. Guaranteed clear, of full strength, and to produce a fine white-coloured salt, Delivered in carboys or railway tank waggons.
For prices and terms address BALE, BAKER, AND CO., 120 & 121, Newgate Street, LONDON.

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SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantities at highest market prices, or contracts for the year.
For price and terms apply Botolph House, Eastcheap, LONDON, E.C.

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 1890: Coal consumed, 8600 tons. Gas made, 92,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

WANTED, to purchase Gas Carbon, delivered at nearest Station to Gas-Works, in quantities of not less than 4 tons.
Address, stating price per ton and quantity, No. 1766, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Hornsey Gas Company have for SALE Two Cast-Iron TOWER SCRUBBERS—one 7 ft. 6 in. diameter by 30 feet high, and the other 10 feet diameter by 40 feet high—in good condition.
Full particulars can be obtained at the GAS-WORKS, Clarendon Road, HORNSEY, N.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 480 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award. Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

TAR and Liquor wanted.
BROTHERTON AND CO., Commercial Buildings, LEEDS.

PENRYN, CORNWALL.

VALUABLE GAS-WORKS IN THE BOROUGH OF PENRYN FOR SALE, TO CLOSE A TRUST ACCOUNT.

MR. THOMAS GILL has been favoured with instructions from the Executors of the late Thomas Bennett, Esq., to SELL BY PUBLIC AUCTION, at Chapman's King's Arms Hotel, Penryn, on Monday, Sept. 15, at Four o'clock in the Afternoon, subject to such conditions as will be there and then read, the following valuable

GAS WORKS:

Consisting of Retorts and Condensers recently erected, Two Gasholders, large Meter for Works, Drawers, Scurfing-Bars, Levellers, Shovels, Picks, Gurries, Wheelbarrows, Tongs, Clinking-Bars, Fire and Arch Bricks, Syphon Pumps, Forcing Pumps, Bends, new and old Iron Pipes, Brass Taps, &c.; 39 Public Lamps on Iron and Wood Posts; 60 Meters on Rental from 2 to 20 lights; 4393 yards of Main Pipes, consisting of 454 yards of 5-inch, 2681 yards of 2-inch, 435 yards of 1¼-inch, 532 yards of 1-inch, 200 yards of ¾-inch, and 100 yards of ½-inch.

The Gashouse, Yard, and Premises are situate in the Parish of Budock, adjoining the Borough of Penryn, and are held under a lease from the Duke of Leeds, dated the 21st day of February, 1837, for 99 years, determinable on the death of one life now aged 65 years, under a high rent of 10s., and a heriot of 10s., payable on the death of the said life.

A printed inventory with full particulars will be ready for delivery a week previous to the Sale.

The purchaser will be required to take at a valuation, to be made in the usual manner, the Coal, Coke, and Tar, that may be on the premises on the 29th of September, 1890.

To view the Works application must be made to Mr. W. S. Olver, jun., Market Strand, Falmouth; and for further particulars, apply to the Auctioneer, Market Street, Penryn; or to

Mr. WILLIAM JENKINS,
Solicitor.

Falmouth, Aug. 22, 1890.

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Inquiries should be addressed to THE AUTOMATIC COAL-GAS COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

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GEORGE JAS. HEALY begs to announce the receipt of instructions from Messrs. the Wigan and Whiston Coal Company, Limited, to Catalogue and SELL BY AUCTION, on Wednesday, Sept. 3, 1890, beginning at Eleven a.m. prompt, a large quantity of very valuable surplus COLLIERY and GAS PLANT.
A few special particulars of the Gas Plant are given below; but a full description of all the lots will be found in the Catalogues, which will be issued Seven days before the date of SALE.

GAS PLANT AT WHISTON COLLIERY.

The whole of the Ironwork complete for 56 Retorts, consisting of Mouthpieces, Ascension-Pipes, Seal and Dip Pipes; Holman's patent Vaporizers attached to Seven Retorts; 74 feet of 20 in. by 20 in. U-shaped Wrought Iron Hydraulic Main, with Angle-Iron Ends; Twelve Hydraulic Main Stands; Ten Buckstays; Condensers complete, consisting of 25 24-inch Socket Pipes, 12 feet long; other Flange and Socket Pipes, Tees, &c.; Two Tar Extractors, each 24 inches; Purifier, 8 ft. by 5 ft.; Gas Exhauster, 8-inch Steam Cylinder, 9-inch stroke; 25 feet diameter Gasholder, and 26 feet Cast-Iron Tank; a Orme Gas-Governor; Two of Anderson's Four-Way Valves (nearly new); 7 feet diameter Tank; 30 ft. by 7 ft. 6 in. Boiler Shell as Scrubber; Eight new 20 in. by 18 in ⌂ Retorts; and other Effects.
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GAS TAR.

THE Gas Committee of the Corporation of Carnarvon invite TENDERS for their surplus TAR for One year from the 1st of September next.

Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Gas Office, Carnarvon, to be delivered not later than the 27th day of September next.

The Gas Committee do not bind themselves to accept the highest or any tender.

For all particulars apply to

MAT. J. PARSONS,
Manager and Engineer.

Gas Office, Carnarvon, Aug. 27, 1890.

CORPORATION OF BURY.

TO TAR DISTILLERS AND OTHERS.

THE Gas Department of the Bury Cor- poration invite TENDERS for TAR for One year, commencing on the 1st of October, 1890, and terminating on the 30th of September, 1891.

Particulars and form of tender may be obtained on application to the undersigned.

The highest tender not necessarily accepted.

Tenders, sealed, and endorsed "Tar," to be addressed and delivered to John Haslam, Esq., Town Clerk, on or before the 23rd of September next ensuing.

W. H. S. GENDALL,
Engineer, &c.

Gas Office, Elton, Bury, Aug. 29, 1890.

COUNTY BOROUGH OF WIGAN.

TO TAR DISTILLERS AND OTHERS.

THE Gas Department of the Wigan Corporation invite TENDERS for TAR for One year, commencing on the 1st of September, 1890, and terminating on the 31st of August, 1891.

Particulars and form of tender may be obtained on application to the undersigned.

The highest tender not necessarily accepted.

Tenders, sealed, and endorsed "Tar," to be addressed and delivered to A. Smith, Esq., Town Clerk, on or before the 15th of September next ensuing.

JOS. TIMMINS,
Engineer, &c.

Borough Gas-Works, Wigan,
Aug. 20, 1890.

BRIDGNORTH CORPORATION GAS-WORKS.

TENDERS FOR SURPLUS TAR.

THE Gas Committee hereby invite TENDERS for the purchase of the surplus TAR (about 100 tons) produced at these Works during One year from the commencement of the contract.

The Tar will be delivered on Rails at Bridgnorth Station in the Contractor's tanks.

Sealed and endorsed tenders to be sent to the undersigned not later than Sept. 12.

Neither the highest nor any tender will necessarily be accepted.

By order,
J. H. COOKSEY, Town Clerk,
Secretary.

Bridgnorth, Aug. 22, 1890.

TIPTON GAS-WORKS.

INLET AND OUTLET PIPES, ETC.

THE Gas Committee of the Tipton Local Board are prepared to receive TENDERS for the supply and erection of 15-inch and 18-inch diameter Wrought-Iron INLET and OUTLET PIPES and ANCHOR PLATES for a new Gasholder.

Drawing and specification may be seen and other particulars obtained at the Gas-Works, on application to Mr. Vincent Hughes, the Engineer.

Sealed Tenders, endorsed "Tender for Inlet and Outlet Pipes, &c.," to be sent to me, the undersigned, not later than Tuesday, the 9th of September, 1890.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
GEO. M. WARING,
Clerk to the Board.

Tipton, Aug. 28, 1890.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors of the Wandsworth and Putney Gaslight and Coke Company are prepared to receive TENDERS for the supply of 40,000 tons of clean, dry, unscreened, fresh-wrought GAS COALS, delivered in covered Barges alongside the Company's Works at Wandsworth in the River Thames.

The Coal to be delivered from time to time in quantities as required by the Company's Engineer, and to extend over Twelve months ensuing, from or about the end of September.

Payment by Cash monthly.

Other particulars can be obtained on application to the Company's Engineer.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders, sealed, and endorsed "Tender for Coals," to be addressed to the Chairman of the Company, and delivered at the Company's Offices not later than the 15th of September.

By order,
WALTER CROMARTY, Secretary.

North Street, Wandsworth, S.W.

HOLMSIDE GAS COALS.

THE Owners of Holmside and South Moor Collieries possess an undivided area of nearly 5000 acres of COAL in the County of Durham, over the greater portion of which area the most of the best Coal of the district, including the well-known Hutton Seam, remains almost untouched; and as preparations are being made for working the Hutton Seam on a large scale, it is expected that the reputation of HOLMSIDE GAS COALS will be still further increased. The Holmside and South Moor Collieries have been in the hands of the same families for over half a century; but, until lately, no adequate attempt has been made to open out their very large Coal-Field, notwithstanding that the best Coal of the district around them, and especially the Hutton Seam, has been for some time past seriously diminished by reason of the vigorous workings of neighbouring coal-owners. Holmside Gas Coals are now being worked out of Holmside and South Moor Collieries at a rate of about 2200 tons per working day—a rate totally inadequate to meet the existing demand. By an extensive development of workings in the Hutton Seam, it is hoped that the demand may be fully met, and the quality raised to the highest point attainable by Durham Coal.

For price and particulars, apply to MARK ARCHER, Holmside and South Moor Offices, Quayside, NEWCASTLE-ON-TYNE.

TENDERS FOR GAS COAL.

THE Directors of the Slough Gas and Coke Company are prepared to receive TENDERS for the supply of 1800 tons of BEST YORKSHIRE SILKSTONE, or other INLAND GAS COAL of a similar quality, unscreened, to be delivered at the Slough Station of the Great Western Railway, during a period of One year, from the 1st of October next, in monthly quantities as may be required.

Payment for Coal within the following month after delivery.

Tenders to be delivered to the undersigned, endorsed "Tender for Gas Coal," on or before Tuesday, the 9th day of September next.

The Directors do not bind themselves to accept the lowest or any tender.

ARTHUR THOMAS, Secretary.

High Street, Slough, Bucks.,
Aug. 27, 1890.

HARTLEPOOL GAS AND WATER COMPANY.

TO IRONFOUNDERS, ETC.

THE Directors of the above Company are prepared to receive TENDERS for the several Works and Materials required in the construction of a WATER-TANK, 17 ft. 9 in. in height, and 60 feet square, internal measurement, together with built and rolled GIRDERS for supporting the same on Tower of Masonry 82 ft. 8 in. in height; also CAST-IRON COLUMNS, INLET, OUTLET, and OVERFLOW PIPES, STRUTS, STAYS, BOLTS, &c., &c., and a WROUGHT-IRON ROOF, 60 feet span, covered with Corrugated Iron.

Plans and Specification may be seen, or any further information obtained, on application to the Company's Engineer, Mr. Thomas Bower, who, if desired, will supply copies of the plans.

Tenders on form prescribed, and sealed and endorsed "Tender for Water-Tank," to be sent to Mr. Thomas Trewhitt, Secretary, Gas and Water Company, West Hartlepool, not later than Wednesday, the 1st day of October next.

The Directors do not bind themselves to accept the lowest or any tender.

By order of the Directors,
THOMAS TREWHITT, Secretary.

Gas and Water Company's Offices,
West Hartlepool, August, 1890.

Price 2s. per dozen, or 10s. 6d. per 100, post free.

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Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

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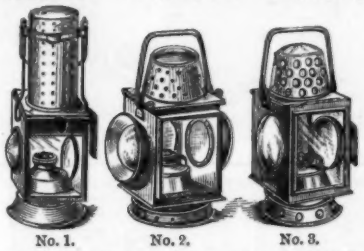
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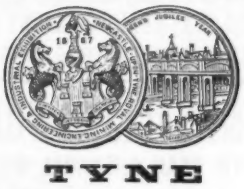

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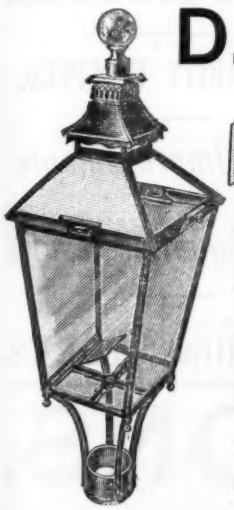

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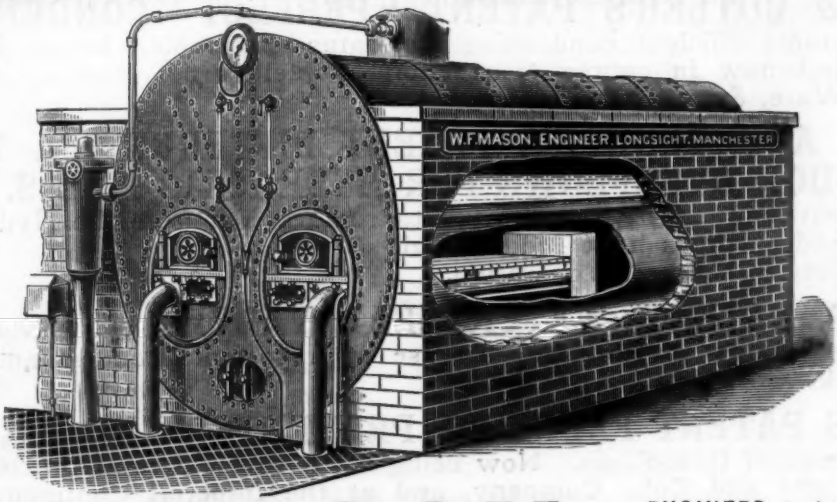

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PERFECT SIMPLICITY OF CONSTRUCTION.

Thorough Economy in Working.

REGULARITY IN SPEED.

Latest Improvements.

Give unequalled results.

Sole Makers: **The CAMPBELL GAS-ENGINE CO., Ld., Halifax, YORKS.**

S. CUTLER & SONS.

Offices: 16, Great George St., Westminster. Works: Millwall, London.

Apparatus of every description for Gas and Water Works.

MORRIS & CUTLER'S PATENT "PERFECT" CONDENSER.
The most efficient condensing apparatus obtainable. In use at 60 Works, and now in course of erection at Melbourne, Hornsey, Winchester, Ware, &c.

LIVESEY AND TANNER'S PATENT DIFFERENTIAL TAR AND LIQUOR OVERFLOWS FOR HYDRAULIC MAINS.
A neat and effective apparatus to remove Tar from the Hydraulic Main, and ensure a light Liquor Seal.
300 Sets in successful operation.

CUTLER'S PATENT WATER-SEAL VALVES, especially suitable for large Mains at Purifiers. In use at important London and Provincial Works.

CUTLER'S PATENT FREEZING PREVENTER AND CIRCULATOR for cups of Gasholders. Now being fitted to Holders at the Works of The Gaslight and Coke Company, and at the Imperial Continental Works at Hanover and Vienna.

Further particulars of these and other useful specialities will be supplied on application to the Westminster Office.

THE VERY

VALUABLE PATENTS

GRANTED TO

MESSRS. GADD & MASON

(For entirely dispensing with the external guide-framing of Gasholders, thereby reducing the cost of construction enormously)

TO BE SOLD,

Or licenses granted on royalty for the following Countries, viz :—

France, Germany, Belgium, United States, Canada, Australia, Italy, Spain, Portugal, Luxembourg, Denmark, Norway, Sweden, Turkey, Russia, Brazil, India, Cape of Good Hope, Natal, Victoria, New South Wales, South Australia, Queensland, Western Australia, New Zealand, and Tasmania.

For those Firms desirous of securing a large business, the acquisition of these Patents would practically give a monopoly of the Gasholder Trade in the above Countries.

ADVANTAGES:

IMMENSE SAVING IN COST. NO COLUMNS. NO FRAMING.

TANK CONSTRUCTION MUCH CHEAPER AND EASIER.

Large saving in Carriage, Freight, Haulage, and Insurance.

ADMITTED by EMINENT ENGINEERS to be the SYSTEM OF THE FUTURE.

Telegrams: "SPIRAL MANCHESTER."

THE PATENT GASHOLDER SYNDICATE,

504, STOCKPORT ROAD, MANCHESTER.

THE CHEAPEST AND BEST LAMP IN THE MARKET.

Suitable for every place where Gaslight is required.

Invaluable for Mills, &c., where the maximum of Light is required at a minimum of cost.

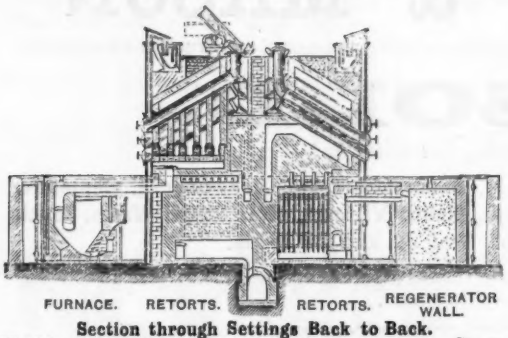
ONE WORKS HAS 96 OF THESE LAMPS FIXED AND GIVING SATISFACTION.

AGENTS WANTED IN EVERY TOWN.

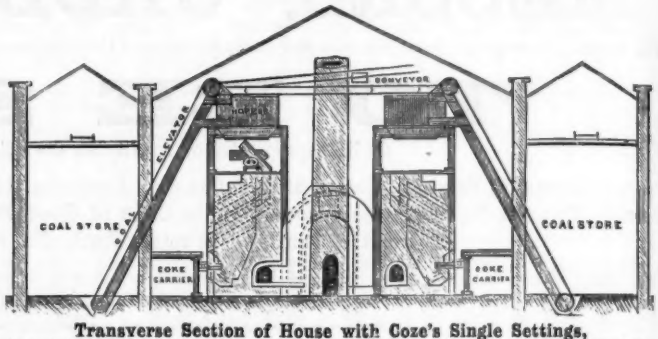
AUTOMATIC SYSTEM OF CHARGING & DRAWING INCLINED GAS-RETORTS.

Gold Medal, Paris Exhibition, 1889.

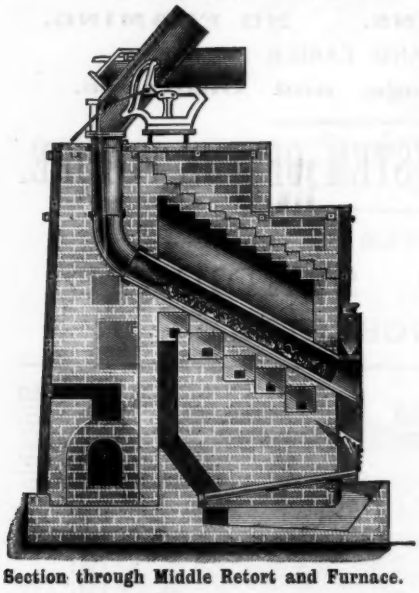
This System of Automatically Charging and Discharging Retorts without machinery or arduous labour is in operation at several places on the Continent and in America, and will shortly be at work in various Gas-Works in England.



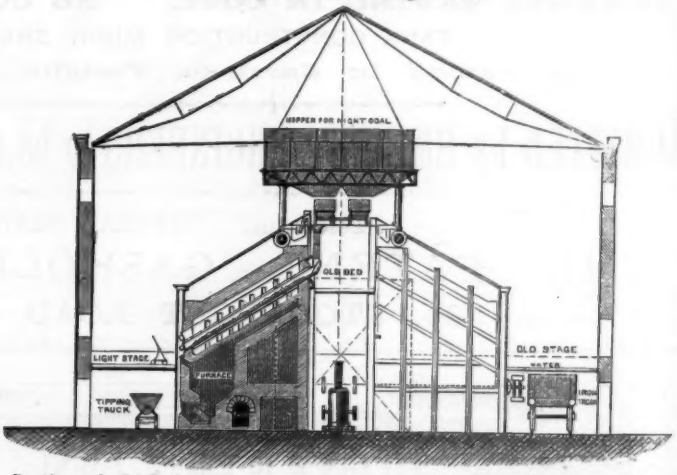
Section through Settings Back to Back. Working off ground floor with Generator under Stage and Regenerator under the Sets.



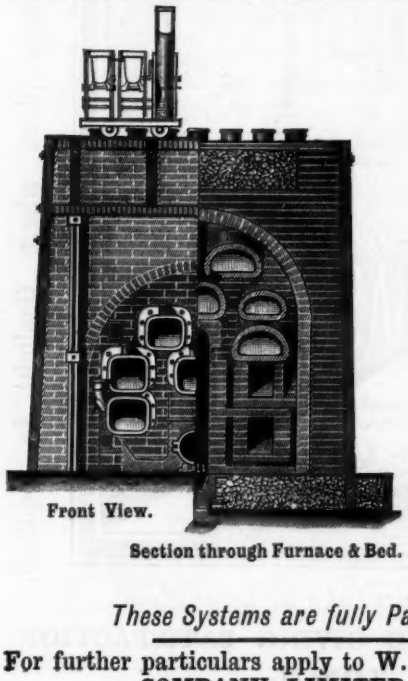
Transverse Section of House with Coze's Single Settings, Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic. This plan is for a large House.



Section through Middle Retort and Furnace.

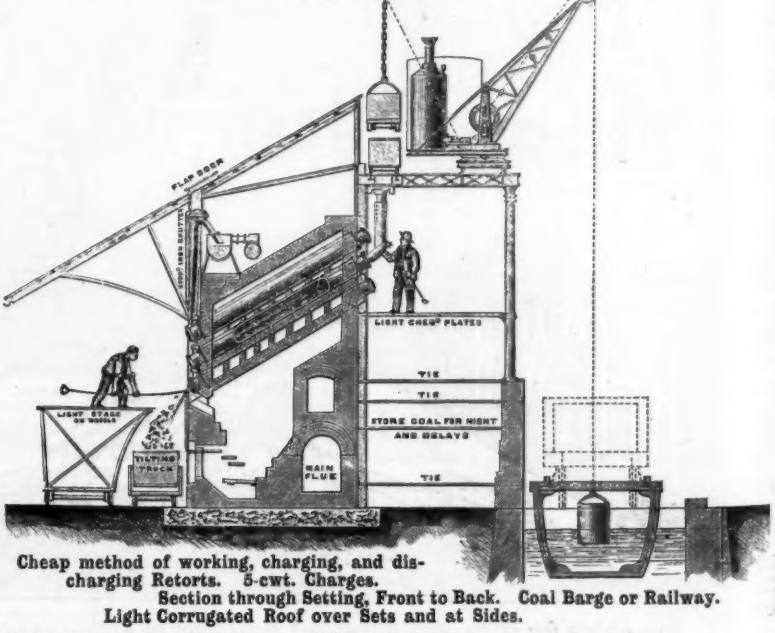


Section of old Retort-House converted, Two Sets 20 fts. in place of One. Modified form, with ordinary Retorts and Fittings.



Front View.

Section through Furnace & Bed.



Cheap method of working, charging, and discharging Retorts. 5-cwt. Charges. Section through Setting, Front to Back. Coal Barge or Railway. Light Corrugated Roof over Sets and at Sides.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

For further particulars apply to W. M. KIGHT, Secretary of THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86 and 88A, LEADENHALL STREET, LONDON, E.C.

JAMES D. PERKINS. F. SEAVERNS.

PERKINS & Co.,

228 & 229, PRODUCE EXCHANGE, NEW YORK.

Cable Address: "PERKINS, NEW YORK." *Post Office Box 3695, New York.*

SOLE AGENTS FOR THE CELEBRATED

BRECKENRIDGE CANNEL

AND THE

OLD KENTUCKY BOGHEAD

OF KENTUCKY, U.S.A.

These Cannels will rank with the Australian Shale for Gas Manufacture.

Also General Sales Agents for

PENNSYLVANIA & VIRGINIA GAS COALS, & AMERICAN FOUNDRY & FURNACE COKE.

Delivery Prices made to any Port in

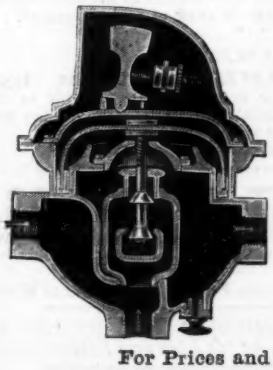
GREAT BRITAIN, ON THE CONTINENT, OR SOUTH AMERICA.

Full Information furnished upon Application to the above Address.

THE WENHAM AUTOMATIC GAS GOVERNOR

As supplied to and approved of by H.M. Government.

The most reliable Automatic Method of economizing Gas without reducing the Illuminating Power.



HUNDREDS ALREADY FIXED.

FLOOR WARMING STOVES

(LEEDS' PATENT).

CAN BE SUPPLIED FOR EITHER GAS OR OIL.

THESE STOVES ARE

CLEANLY, PORTABLE, ECONOMICAL,

And applicable for all kinds of Rooms where a Comfortable and Wholesome Atmosphere is desired.

For Prices and further Particulars, apply to the Manufacturers,

THE WENHAM COMPANY, LTD.,

UPPER OGLE STREET, FITZROY SQUARE, LONDON, W.

MANCHESTER: 5, Deansgate. BIRMINGHAM: 121, Corporation Street.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S PATENTS

All Spent Limes are most effectually, economically, and continuously recovered, and at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it. Descriptive Pamphlet and Terms from Agents as under.

— REGENERATIVE SETTINGS OF RETORTS. —

Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable, while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

The Schülke Regenerative Lamp

FOR

DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).

Can be fixed in a few minutes.

May be seen at the Offices of the

SCHÜLKE GAS-LAMP Co.

LIMITED,

Room 446—11, QUEEN VICTORIA STREET, LONDON, E.C.,

Where Price Lists and full particulars may be obtained.

WEST'S GAS IMPROVEMENT Co., Ltd.,

Engineers, Ironfounders, & Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

WEST'S PATENTED MACHINERY FOR CHARGING AND DRAWING GAS-RETORTS.

OVER **160** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

Advantages attending its use are:—

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by WIRE ROPE, STEAM, or COMPRESSED AIR.—The power machines are applicable to circular, oval, or Ω-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

ole Makers of **Circular, Oval,** or Ω-Shaped **Mouthpieces,** with Morton's Self-Sealing Lids fitted with

KING'S PATENT FASTENINGS,

which, by a simple wedging action at each end of the crossbar, secure a very tight joint; and at the same time, by their long sliding motion, they effectually remove the tar or other matter from the surfaces of the mouthpiece and lid.

N.B.—The whole of these Fittings are made of Wrought Iron.

Estimates and further particulars forwarded upon application for Mouthpieces complete, or for Lids and Fastenings separately.

Makers of THOMAS & SOMERVILLE'S COKE-BREAKING MACHINE.

Sole makers of WHITE'S PATENT AUTOMATIC GAS-VALVE.

Mr. JOHN WEST, M. Inst. C.E., *Managing Director.*

ILLUSTRATED CATALOGUE SENT UPON APPLICATION.

RED OXIDE OF IRON PAINT.

THE BEST KNOWN PRESERVATIVE FOR IRONWORK.

Sold in **large quantities** on better terms than can be obtained from any other manufacturer.

Also sold in powder in 1 cwt. kegs, at 7/6 per cwt.

In oil as a paste ready for mixing, at 25/- per cwt.

As a paint ready mixed for use, at 8/9 per gallon, in 5-gallon cans, or in packages to suit buyers.

INQUIRIES SOLICITED.

Boiler Incrustation Prevented

BY USING

Used at the following Gas-Works:—Ascot, Birmingham, Broadstairs, Bromsgrove, Hendon, Leven, N.B., Pembroke, Seaham Harbour, Stamford, Warwick, &c., &c.; and by leading Engineers throughout the country.

Absolutely harmless, and the most economical means of preventing Incrustation obtainable.

TESTIMONIALS ON APPLICATION.

ADOLPHE CROSBIE, Walsall Street Chemical Works, WOLVERHAMPTON.

WATER GAS.

THE BRITISH WATER GAS SYNDICATE, LTD.,

Is prepared to give Estimates for, and undertake the erection of,

Water-Gas Plant for Steel Manufacture, Puddling, Glass Melting, Singeing Fabrics, &c.; and for Illuminating and all other purposes.

Competent Engineers are sent out to advise as to the best means of application.

The BRITISH WATER GAS SYNDICATE, LTD., LEEDS.

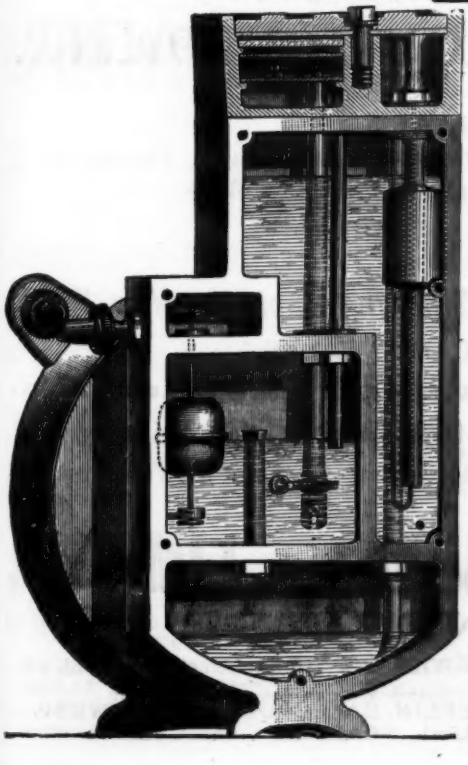
Telegrams—"WATERGAS, LEEDS."

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.



Sole Makers of Green's Patent Underground Wet Gas-Meters for Street Lighting, &c., and Ogden's Patent Spindle Tube for Wet Gas-Meters.

GREEN'S PATENT UNDERGROUND METER

Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required, and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s., and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 8½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid, which does not injure the fittings; and this can be supplied at about 1s. per gallon.

Prices and all Information on Application.

GRANGE WORKS, EDINBURGH.

HIGHEST AWARDS given for our WET and DRY METERS at

Exhibitions held at GLASGOW, CALCUTTA, and EDINBURGH.

BELL'S ASBESTOS AQUOL PAINT

BELL'S ASBESTOS

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. AMSTERDAM: 264, N. Z. Voorburgwal. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM: BELL and Co., 7, John Bright Street. CARDIFF: BELL and Co., West Bute Street.

BELL'S ASBESTOS

EXPANSION SHEETING.

EXPANSION RING.

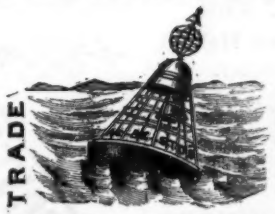
The above, which can only be obtained from this house, is recognized as the **most efficient and economical jointing material in use.** It is composed of a specially-prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above; and as it is the only Jointing Material which adequately **combines permanent elasticity with heat resistance,** the advantage it possesses will at once be seen.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow the expansion and contraction to be fully taken up. The covering being of Asbestos Cloth imparts a protection to the centre, and so prolongs its elasticity. **For Manhole, Mudhole, Steam Pipe, and Mash Tun Door Joints, it is unequalled;** and if applied as directed, **a ring can be used many times over.**

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.



BELL'S ASBESTOS.

DEPÔTS.
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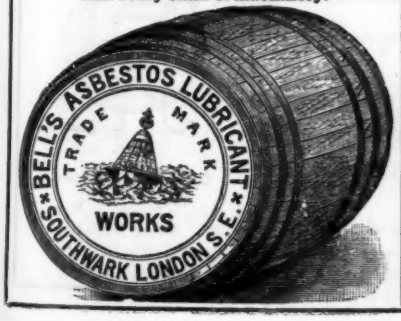
BARCELONA, and ANTWERP.
AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
CARDIFF: BELL and Co., West Bute St.

Southwark, London, S.E.

BELL'S ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

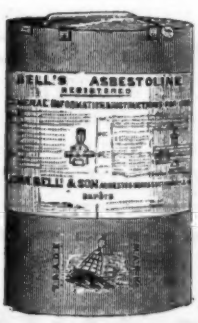
BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for
Hydraulic Machinery, Accumulators and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

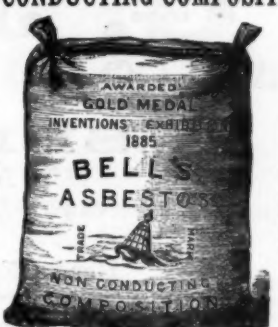
ASBESTOLINE IN THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.



ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
"DAGGER" PACKING
Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient durable, and economical Packing made.

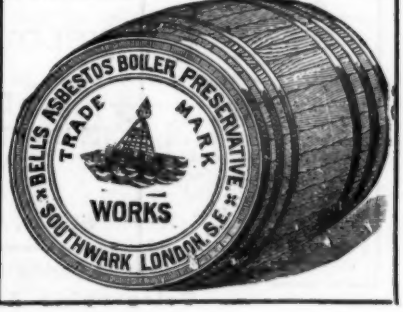
BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.
Will reduce loss by radiation and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be supplied again after many years' service. Is sent out dry in bags: therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



HENRY BALFOUR & CO.,

LEVEN, FIFE,

MAKERS OF

GASHOLDERS

And all classes of GAS PLANT,

REVOLVING BRUSH SCRUBBERS, FOUR-WAY VALVES.

LONDON: 13, BILLITER STREET, E.C.

WILLIAM GRICE & CO.

Ironfounders, Gas and General Engineers,

Fazeley Street Works, BIRMINGHAM.

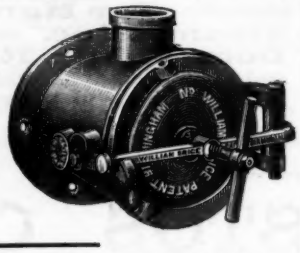
MANUFACTURERS OF

Grice's Patent Self-Sealing Mouthpieces.

To suit all sized sections of Retort. Over 70 stock sizes. Largely used in England.

Grice's Patented Stoking Machinery.

Made to suit large or small Gas-Works. The one machine draws the spent coke and recharges the Retort at one operation. Self-contained; working from engine on base or by hand. Price and particulars on application.



PURIFIERS, TANKS, PIPES, & OTHER PLANT MADE.

Machine-Moulded Spur, Bevel, Mitre, and Helical Wheels and Pulleys, to 20 feet diameter.

WROUGHT-IRON WAREHOUSE CRANES

As supplied to the English Railway Companies.

MORTAR & LOAM MILLS.

With or without Engines.

PUNCHING AND SHEARING MACHINERY

Of all Kinds.

ENGINES. Vertical and Horizontal; High and Low Pressure
CONDENSING BOILERS; Tubular and Ordinary CASTINGS.
All descriptions up to 15 tons.

HORSELEY COMPANY, LTD.

TIPTON, STAFFORDSHIRE.

London Office: 6, Westminster Chambers, Victoria Street.

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS,

AND ALL KINDS OF GAS AND WATER WORKS PLANT.

J. & W. HORTON

ETNA WORKS,

SMETHWICK,

NEAR BIRMINGHAM

(Established 50 Years),

PATENTEES

AND

MANUFACTURERS

OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus,

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimates supplied.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

Head Office: CORPORATION STREET, BIRMINGHAM.

JOHN BROTHERTON, LIMITED,

IMPERIAL TUBE WORKS,

WOLVERHAMPTON,

Paris Exhibition 1867.
Amsterdam Exhibition 1883.
Silver Medal and First-Class Certificate
Bronze Medal and Special Diploma
Adelaide Exhibition 1887.
First Order of Merit and Medal.

MANUFACTURERS OF

WELDED IRON TUBES AND FITTINGS

FOR GAS, STEAM, WATER, &c.

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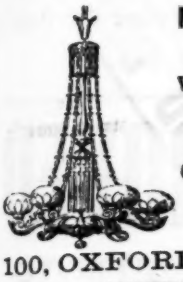

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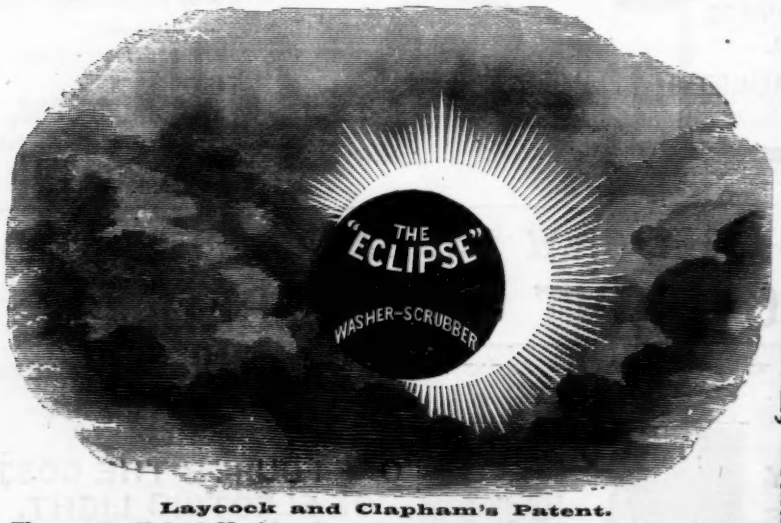

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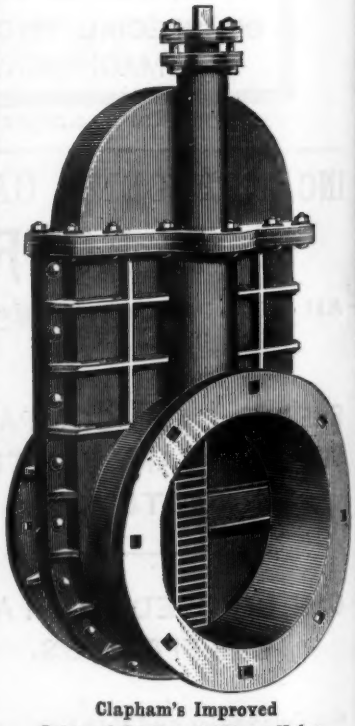

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